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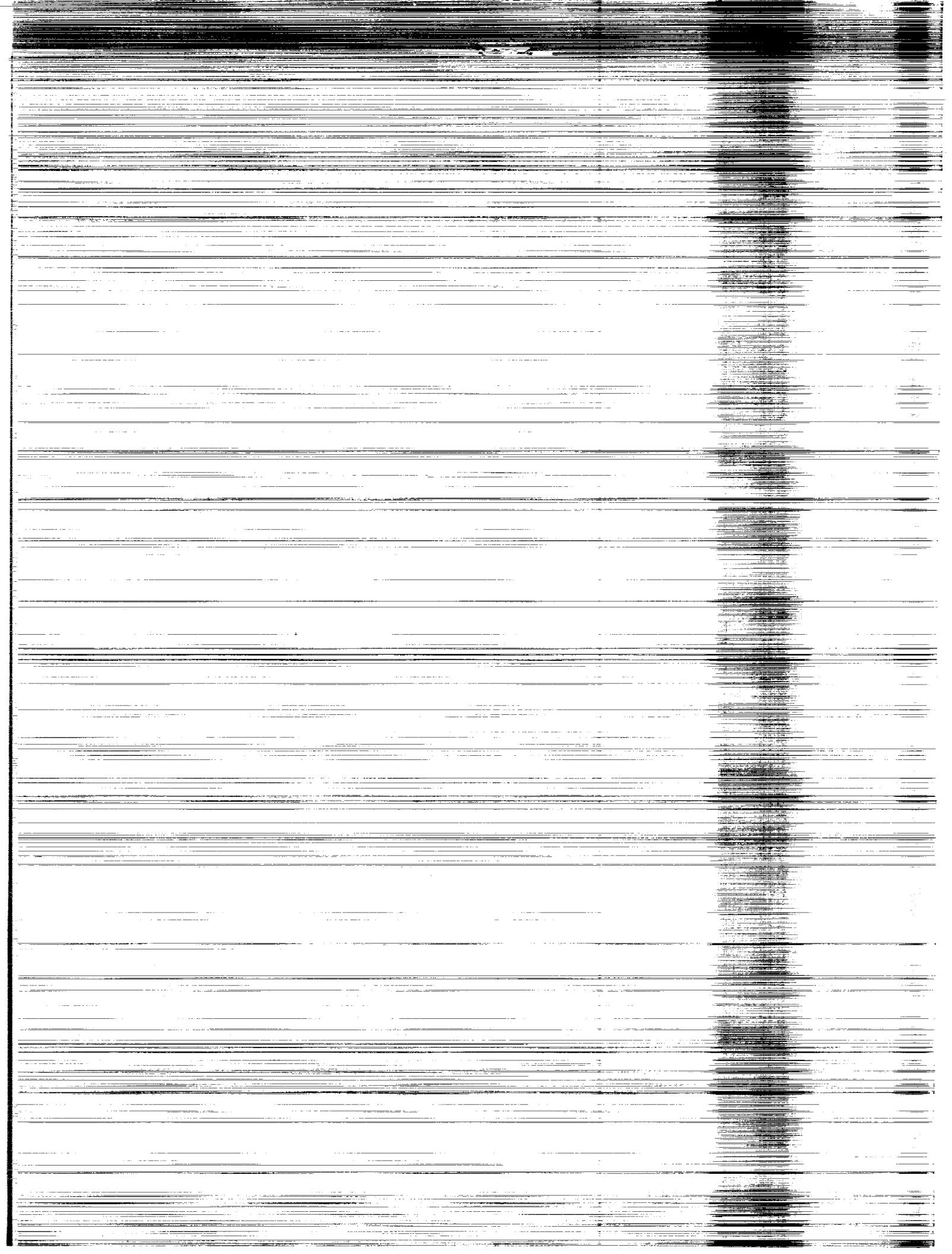
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Performance Data From a Wind-Tunnel Test of Two Main-Rotor Blade Designs for a Utility-Class Helicopter

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Summary

An investigation was conducted in the Langley Transonic Dynamics Tunnel to evaluate an advanced main rotor designed for use on a utility-class helicopter, specifically the U.S. Army UH-60A Black Hawk. This rotor design incorporated advanced twist, airfoil cross sections, and geometric planform. For evaluation purposes, the current UH-60A main rotor was also tested and is referred to as the baseline blade set. A total of four blade sets were tested. One blade set of the baseline rotor and one of the advanced rotor were dynamically scaled to represent a full-scale helicopter rotor-blade design. The remaining advanced and baseline blade sets were not dynamically scaled so that the effects of structural elasticity could be isolated and studied. The investigation was conducted in hover and at rotor advance ratios ranging from 0.15 to 0.4 at a range of nominal test-medium densities from 0.00238 to 0.009 slug/ft³. This range of densities, coupled with varying rotor lift and propulsive force, allowed for the simulation of several combinations of vehicle gross weight and density altitude. Performance data are presented for all blade sets without analysis; however, cross-referencing of data with flight condition may be useful to the analyst for validating aeroelastic theories and design methodologies as well as for evaluating advanced-design parameters.

Introduction

The rotorcraft industry is currently undergoing a period of rapid technology development. As the technology becomes increasingly complex, the need arises for augmenting the design phase of rotor system development with complementary wind-tunnel testing and analysis. In the past, the testing of scale models has not played as great a role to the helicopter industry as it has to the fixed-wing industry (ref. 1). However, the complicated designs of hingeless and bearingless rotors as well as advances in blade airfoils, geometry, and twist distribution have provided the impetus for addressing the problems of rotor performance, loads, vibration, and stability during the early stage of rotor development. One method of addressing these problems is the evaluation of new rotor systems through the use of scale-model rotors. One such evaluation concerned a comparison of the current rotor of the U.S. Army UH-60A Black Hawk helicopter as a baseline rotor with an advanced-design rotor (ref. 2). A thorough compilation of the performance data from that evaluation is contained herein. The advanced-design rotor incorporated advanced airfoils, geometry, and twist distribution and was designed using the approach of

reference 3. The analyses employed for the aforementioned evaluation combined momentum theory and blade-element theory (ref. 4) for the hover conditions and the computer program of reference 5 for the forward flight conditions. All testing was conducted in the Langley Transonic Dynamics Tunnel (TDT) using 1/6-scale models both in hover and forward flight up to an advance ratio of 0.4. The test specimens included two sets of geometrically scaled rotors and two sets of dynamically scaled rotors. Model lift and drag were varied to simulate changes in vehicle gross weight, propulsive force, and density altitude.

Symbols

The positive directions of forces, moments, angles, and velocities are shown in figure 1.

A	balance axial force, lb
A_1	rotor first-harmonic lateral cyclic pitch angle, deg
a	speed of sound, ft/sec
a_0	airfoil-section lift-curve slope, per radian
B_1	rotor first-harmonic longitudinal cyclic pitch angle, deg
C_D	rotor drag coefficient, $D/\rho\pi R^2(\Omega R)^2$
C_L	rotor lift coefficient, $L/\rho\pi R^2(\Omega R)^2$
C_Q	rotor torque coefficient, $Q/\rho\pi R^3(\Omega R)^2$
C_T	rotor thrust coefficient, $T/\rho\pi R^2(\Omega R)^2$
c	nominal blade chord, ft
D	rotor drag, $N \sin \alpha_s + A \cos \alpha_s$, lb
d	rotor diameter, ft
f_D	equivalent parasite area, ft ²
I_b	blade mass moment of inertia about flapping hinge, slug-ft ²
I_θ	blade torsional mass moment of inertia about elastic axis, lb-sec ² /ft
L	rotor lift, $N \cos \alpha_s - A \sin \alpha_s$, lb
M_T	rotor-tip Mach number in hover, $\Omega R/a$
$M_{1,90}$	tip Mach number at $r/R = 1.0$ and 90° azimuth
N	balance normal force, lb
Q	rotor-shaft torque, ft-lb
R	rotor radius, ft
r	spanwise distance along blade radius from center of rotation, ft

<i>S</i>	balance side force, lb
<i>T</i>	rotor thrust, lb
<i>V</i>	free-stream velocity, ft/sec
<i>z</i>	distance from wind-tunnel floor to rotor plane of rotation, ft
α_s	rotor-shaft angle of attack, deg
γ	rotor-blade Lock number, $\rho a_0 c R^4 / I_b$
θ	rotor-blade collective pitch angle at $r/R = 0.75$, deg
θ_1	twist angle built into rotor blade, positive nose up, deg
μ	rotor advance ratio, $(V \cos \alpha_s) / \Omega R$
ρ	test-medium mass density, slug/ft ³
Ψ	rotor-blade azimuth angle, deg
Ω	rotor rotational velocity, rad/sec
ω	natural frequency of rotating blade mode, rad/sec

Apparatus and Procedures

Wind Tunnel

The investigation was conducted in the Langley Transonic Dynamics Tunnel (TDT). A schematic of the TDT is shown in figure 2. The TDT is a continuous-flow tunnel with a slotted test section capable of operation up to a Mach number of 1.2 at stagnation pressures of 0.1 to 1.0 atmosphere. The tunnel test section is 16 ft square with cropped corners and has a cross-sectional area of 248 ft². Either air or refrigerant-12 (R-12) may be used as the test medium. For this investigation, R-12 was used as the test medium at a range of densities from 0.00382 to 0.009 slug/ft³. Air at atmospheric pressure (with a density of 0.00238 slug/ft³) was also used as the test medium for some hover conditions. Because of its high density at normal atmospheric pressure and its low speed of sound, the use of R-12 aids the matching of model-rotor-scale Mach number to full-scale values and provides Reynolds numbers greater than those obtainable using air. Furthermore, some restrictions on model structural design parameters are eased while maintaining dynamic similarity. The heavier test medium permits a simplified structural design to obtain the required stiffness characteristics, and thus eases design and fabrication requirements of the model (ref. 6).

Model Description

The model rotor hub used in this investigation was a four-bladed articulated hub with coincident lead-lag and flapping hinges. The hub was operated with a pitch-flap coupling ratio of 0.5 (flap up, pitch down). The attachment point of the blade pitch link was 1.4 in. aft of the blade pitch axis. Four sets of blades were used during these tests: (1) a baseline stiff blade set, (2) an advanced-design stiff blade set, (3) a baseline dynamically scaled, or elastic, blade set, and (4) an advanced-design elastic blade set. The structural properties and rotating natural frequencies of the stiff blade sets are presented in tables 1 and 2, whereas those of the elastic blade sets are presented in tables 3 and 4. The rotating natural frequencies were calculated using the Comprehensive Analytical Model of Rotorcraft Aerodynamics and Dynamics (CAMRAD) analysis described in references 7 and 8. The dynamic characteristics of the stiff blade sets do not represent actual helicopter blades in terms of flapwise (out-of-plane), chordwise (in-plane), or torsional stiffness and were included in the investigation solely to isolate the effects of structural elasticity. The dynamic characteristics of the baseline elastic blades are representative of the current main rotor of the UH-60A helicopter. The dynamic properties of the advanced-design elastic blades are representative of a full-scale helicopter design, should such blades be built.

The baseline blade sets were 1/6-size, Mach-number-scaled representations of rotor blades in use on the U.S. Army UH-60A utility-class helicopter. These blades were untapered with a 20° swept tip with sweep initiating at the 94-percent-radius station. The baseline blades used SC1095 and SC1095-R8 airfoils. Aerodynamic characteristics of these airfoils are documented in reference 9. The area, thrust-weighted, and torque-weighted solidities for the baseline rotor were all 0.0825. The planform geometry and twist distribution of these blades are shown in figure 3. One blade of each baseline blade set was instrumented with resistance-wire strain gauge bridges calibrated to measure blade structural moments. These gauges were used to monitor the load limits for safety considerations. Embedded in each baseline stiff blade were four hollow steel tubes extending along the leading and trailing edges of the blade spar centered about the quarter-chord. These tubes allowed for distributed nonstructural mass to be added to the blades from the blade root to the 80-percent-radius station. Steel or tungsten rods were inserted into these tubes to ballast the blade to match the Lock number for the tunnel test-medium operating density.

The advanced sets of model rotor blades were also 1/6-size and Mach-number-scaled and had a 3:1 taper ratio with taper initiating at the 80-percent-radius station and extending to the tip. The advanced blade sets utilized RC(4)-10, RC(3)-10, and RC(3)-08 airfoils. Aerodynamic characteristics of the RC(3)-08 and RC(3)-10 airfoils are documented in reference 10. The aerodynamic characteristics of the RC(4)-10 airfoil have been obtained but have not been reported on at this time. The area, thrust-weighted, and torque-weighted solidities for the advanced rotor were 0.114, 0.101, and 0.0956, respectively. The advanced blade geometric planform and twist distribution are shown in figure 4. The advanced blade sets were also instrumented with resistance-wire strain gauge bridges to monitor the blade bending moments. Each advanced stiff blade had two hollow steel tubes centered about the quarter-chord and extending along the spar from the root to the 80-percent-radius station. Steel or tungsten weights could be inserted into the tubes to ballast the blades for the tunnel operating density and match the Lock number. Each blade of the advanced elastic blade set was equipped with a magnesium weight block centered radially at the 60-percent-radius station. The purpose of this weight block was to permit the addition of non-structural mass for reasons of vibration-reduction research. From three to seven nonstructural masses could be added, with each mass averaging 0.054 lb.

All sets of blades were tested using the aeroelastic rotor experimental system (ARES) model shown in figures 5 and 6. The ARES has a streamlined fuselage enclosing the rotor controls and drive system. The ARES is powered by a variable-frequency synchronous motor rated at 47-hp output at 12 000 rpm. The motor is connected to the rotor shaft through a belt-driven two-stage speed reduction system. The ARES rotor control system and rotor-shaft angle of attack are remotely controlled from the wind-tunnel control room. The model rotor-shaft angle of attack is varied by an electrically controlled hydraulic actuator. Blade collective pitch and lateral and longitudinal cyclic pitch are input to the rotor shaft through a swashplate. The swashplate is moved by three hydraulic actuators.

Instrumentation on the ARES allows continuous displays of model rotor control settings, rotor moments and forces, blade structural moments, and pitch-link loads. The ARES rotor-shaft pitch attitude is measured by a static accelerometer, and rotor control positions are measured by linear potentiometers connected to the swashplate. Rotor-blade flapping and lagging are measured by rotary potentiometers mounted on the rotor hub and geared to the rotor cuff. Rotor-shaft speed is determined

by a magnetic sensor. The rotating-blade data are transferred through a 30-channel slip-ring assembly. Rotor forces and moments are measured by a six-component strain gauge balance mounted below the rotor pylon and drive system. The balance is fixed with respect to the rotor shaft and pitches with the fuselage. Fuselage forces and moments are not sensed by the balance.

Test Procedure and Data Reduction

The purpose of this investigation was to compare the performance characteristics of a baseline and an advanced rotor system, and to examine the effects of Mach number, Lock number, Reynolds number, and dynamic scaling; therefore, all blade sets were evaluated at the same nominal test conditions defined by f_D , M_T , C_L , and C_D . Values of M_T , C_L , and C_D were varied to simulate density altitude, vehicle gross weight, and propulsive force defined by f_D . Tables 5 and 6 outline the test conditions ρ , I_b , M_T , and γ for the stiff and elastic blade sets, respectively. Each blade set was ballasted for a specified test-medium density as indicated in tables 5 and 6. Variations in Reynolds number and Lock number were then achieved by varying the tunnel operating density. For test points concerning vibration reduction, three, five, or seven nonstructural masses were added to each advanced elastic blade centered at the 60-percent-radius station. At each test point, the rotor rotational speed and tunnel conditions were adjusted to give the desired values of tip Mach number and advance ratio. The model was then pitched to give the desired shaft angle of attack. Blade collective pitch was changed to obtain variations in rotor lift and propulsive force. At each collective pitch setting, the cyclic pitch was used to remove rotor first-harmonic flapping with respect to the rotor shaft. Data were then recorded at each value of collective pitch. The maximum value of collective pitch attained at each shaft angle of attack was determined in most cases by either the blade load limits or the ARES drive-system limits. Rotor aerodynamic performance and blade loads were measured in hover and in forward flight at advance ratios ranging from 0.15 to 0.4 for a range of α_s from 0° to -11.8° .

Model deadweight tares were determined throughout the range of shaft angles of attack with the blades on and with them removed. Aerodynamic rotor hub tares were determined with the blades removed throughout the ranges of shaft angle of attack and advance ratios investigated. Both deadweight and aerodynamic hub tares have been removed from the data presented herein. All data were acquired at z/d equal to 0.87. For hover cases, the test-section floor and model were lowered approximately 3 ft,

thus maintaining a value of z/d of 0.87. The resulting gap along the lower sidewalls of the test section opened into a plenum surrounding the slotted test section. Coupled with the test-section slots, this served to minimize rotor wake recirculation in hover. No correction has been applied to the data to account for tunnel wall effects; however, for the flight conditions tested, these effects have been shown to be small (ref. 11). Prior to each test run, all strain gauge and balance voltage readings were zeroed with the blades resting on the down stops and not rotating. At each test point, tunnel parameter data were averaged and stored digitally. Performance data, i.e., fixed-system forces and moments, were averaged and stored as digital counts. At the completion of each run, all strain gauge and balance voltage readings were again recorded with the blades resting on the down stops and not rotating. These final voltage readings were used to correct for any amplifier voltage drift.

Presentation of Data

The rotor performance data obtained during this investigation are presented in tabular form. In hover, the rotor performance parameters C_T and C_Q are presented along with the corresponding rotor control angles A_1 , B_1 , and θ . For forward flight, rotor performance parameters C_L , C_D , and C_Q are presented with the control angles α_s , A_1 , B_1 , and θ as well as with μ and $M_{1,90}$. A linear correction based on point number and determined from prerun and postrun voltage readings is applied to performance data to remove any amplifier voltage drift that may have occurred during the run.

The quality of performance data obtained during this test, with regard to repeatability, was addressed. During the conduct of the test, randomly selected "target" data points were repeated. Approximately 5 percent of the forward-flight data were used as repeat points. The average deviation in C_L , C_D , and C_Q was determined from the differences between the "target" values and the repeated values. The average deviations for constant α_s and μ were determined to be as follows:

$$C_L \pm 0.00004$$

$$C_D \pm 0.00001$$

$$C_Q \pm 0.00001$$

The data presented are grouped according to rotor Lock number, tunnel operating density, and advancing blade-tip Mach number. Performance data may be referenced by point and run number in order to cross-reference the test conditions. The data are presented in the following order:

Table

Rotor Lock number and tunnel operating density for stiff blade sets	5
Rotor Lock number and tunnel operating density for elastic blade sets	6
Rotor performance for baseline stiff blade set	7-9
Rotor performance for baseline elastic blade set	10
Rotor performance for advanced stiff blade set	11, 12
Rotor performance for advanced elastic blade set	13, 14

Concluding Remarks

Performance data have been compiled for four scale-model helicopter rotors incorporating differences in structural and geometric parameters. The test compared two main-rotor systems in order to evaluate differences between an advanced main-rotor design for possible use on a utility-class helicopter relative to an existing baseline rotor design for the same aircraft. As was shown in NASA TM-89129, the advanced-design rotor exhibited performance improvements over the baseline rotor in hover above a rotor lift coefficient (C_L) of 0.00625 as well as at all forward-flight conditions. Also included are performance data from vibration-reduction test points. Although no analysis of the data is presented herein, cross-referencing of performance data from blade set to blade set at specific tunnel operating densities and tip Mach numbers may be useful to the analyst for validating rotor aeroelastic theories and design methodologies.

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March 15, 1990

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Table 1. Properties of Baseline Stiff Blade Set

(a) Structural properties

Inboard section, r/R	Section length, ft	Section mass, slugs	Stiffness, lb-ft ²			I_θ , lb-sec ² /ft
			Flap	Chord	Torsion	
0.0534	0.1073	0.02460	101 944.0	104 166.7	6763.9	0.190×10^{-3}
.0763	.1078	.01710	101 944.0	104 166.7	6763.9	.190
.0993	.1068	.01690	101 944.0	104 166.7	6763.9	.190
.1221	.0005	.00004	51 319.2	55 006.8	3496.4	.100
.1222	.1776	.01620	512.1	5 847.5	228.8	.006
.1601	.3331	.00790	323.5	5 847.5	228.8	.006
.2312	.2502	.00500	311.3	5 847.5	228.8	.006
.2846	.0618	.00100	305.4	5 847.5	228.8	.006
.2978	.2052	.00330	305.4	5 847.5	228.8	.006
.3416	.2057	.00330	305.4	5 847.5	228.8	.006
.3855	.2057	.00330	305.4	5 847.5	228.8	.006
.4294	.2057	.00330	305.4	5 847.5	228.8	.006
.4733	.2057	.00330	305.4	5 847.5	228.8	.006
.5172	.2057	.00330	305.4	5 847.5	228.8	.006
.5611	.2057	.00330	305.4	5 847.5	230.4	.006
.6050	.2057	.00330	305.4	5 847.5	232.8	.006
.6489	.2057	.00330	305.4	5 847.5	234.4	.006
.6928	.2057	.00330	305.4	5 847.5	235.9	.006
.7367	.2057	.00330	305.4	5 847.5	236.6	.006
.7805	.2057	.00330	305.4	5 847.5	236.3	.006
.8244	.2057	.00330	297.3	5 847.5	235.0	.006
.8683	.1818	.00250	282.6	5 847.5	231.8	.006
.9071	.1003	.00110	270.9	5 847.5	228.1	.006
.9285	.0005	.00001	265.8	5 847.5	226.6	.006
.9286	.0661	.00064	259.4	5 847.5	225.2	.006
.9427	.0628	.00050	252.6	5 847.5	222.6	.006
.9561	.2057	.00170	177.8	5 847.5	215.0	.006

(b) Model rotor-blade rotating natural frequencies predicted via CAMRAD

Modal identity	ω/Ω (a)
Flap	3.04
Flap	6.46
Chord	7.86

^a $\Omega = 68.07$ rad/sec.

Table 2. Properties of Advanced-Design Stiff Blade Set

(a) Structural properties

Inboard section, r/R	Section length, ft	Section mass, slugs	Stiffness, lb-ft ²			I_θ , lb-sec ² /ft
			Flap	Chord	Torsion	
0.0534	0.1073	0.02460	101 944.0	104 166.7	6 763.9	4.095×10^{-3}
.0763	.1078	.01710	101 944.0	104 166.7	6 763.9	.190
.0993	.1068	.01690	101 944.0	104 166.7	12 625.0	.190
.1221	.0005	.00004	51 601.4	59 432.4	6 813.0	.177
.1222	.6358	.01300	1 258.7	14 698.0	1 000.9	.164
.2579	.2914	.00590	1 102.5	14 698.0	996.3	.164
.3201	.1007	.00210	946.2	14 698.0	991.7	.164
.3416	.2057	.00420	946.2	14 698.0	991.7	.164
.3855	.2057	.00420	946.2	14 698.0	991.7	.164
.4294	.2057	.00420	946.2	14 698.0	991.7	.164
.4733	.2057	.00420	946.2	14 698.0	991.7	.164
.5172	.2057	.00420	946.2	14 698.0	991.7	.164
.5611	.2057	.00420	946.2	14 698.0	991.7	.164
.6050	.2057	.00420	946.2	14 698.0	991.7	.164
.6489	.2057	.00420	946.2	14 698.0	991.7	.164
.6928	.2057	.00420	946.2	14 698.0	991.7	.164
.7367	.2151	.00440	946.2	14 698.0	991.7	.164
.7826	.0815	.00170	923.1	14 698.0	978.8	.164
.8000	.0005	.00001	900.0	14 698.0	965.9	.164
.8001	.1551	.00310	750.4	14 698.0	965.9	.164
.8332	.2628	.00390	428.0	14 698.0	953.0	.164
.8893	.2511	.00180	201.4	14 698.0	904.1	.164
.9429	.2675	.00080	94.7	14 698.0	834.2	.164

(b) Model rotor-blade rotating natural frequencies predicted via CAMRAD

Modal identity	ω/Ω (a)
Flap	3.96
Flap	10.13
Chord	12.17

^a $\Omega = 68.07$ rad/sec.

Table 3. Properties of Baseline Elastic Blade Set

(a) Structural properties

Inboard section, r/R	Section length, ft	Section mass, slugs	Stiffness, lb-ft ²			I_θ , lb-sec ² /ft
			Flap	Chord	Torsion	
0.0534	0.322	0.0510	101 944.0	104 166.7	6763.9	0.570×10^{-3}
.1222	.166	.0110	9 326.4	69 444.4	1269.6	.143
.1577	.333	.0062	9 326.4	2 777.8	432.1	.050
.2288	.333	.0062	74.3	2 777.8	236.1	.050
.2999	.333	.0062	74.3	2 777.8	88.9	.050
.3710	.333	.0062	74.3	2 777.8	88.9	.080
.4421	.333	.0062	81.3	2 777.8	91.6	.080
.5132	.333	.0062	75.7	2 777.8	93.1	.080
.5843	.333	.0062	81.3	2 777.8	94.4	.080
.6554	.333	.0062	81.3	2 777.8	94.4	.080
.7265	.333	.0062	81.3	2 777.8	94.4	.080
.7976	.333	.0062	86.8	2 777.8	92.4	.080
.8687	.207	.0054	33.3	694.4	95.4	.117
.9128	.073	.0024	33.3	694.4	27.1	.117
.9283	.336	.0045	21.5	347.2	22.0	.117

(b) Model rotor-blade rotating natural frequencies predicted via CAMRAD

Modal identity	ω/Ω (a)
Flap	2.69
Flap	4.76
Chord	5.12
Torsion	7.21
Flap	8.16

$$^a\Omega = 69.32 \text{ rad/sec.}$$

Table 4. Properties of Advanced-Design Elastic Blade Set

(a) Structural properties

Inboard section, r/R	Section length, ft	Section mass, slugs	Stiffness, lb-ft ²			I_θ , lb-sec ² /ft
			Flap	Chord	Torsion	
0.0534	0.1070	0.02460	101 944.0	104 166.7	6 763.9	0.570×10^{-3}
.0763	.2150	.03400	101 944.0	104 166.7	6 763.9	.190
.1221	.0005	.00004	101 944.0	104 166.7	6 763.9	.190
.1222	.1770	.00410	2 500.0	10 277.8	12 625.0	.242
.1600	.2480	.00430	354.1	10 277.8	261.1	.242
.2130	.1690	.00260	302.1	10 277.8	261.1	.226
.2490	.5200	.01220	270.1	10 277.8	261.1	.359
.3600	.9650	.02260	225.7	10 277.8	261.1	.359
.5659	.3330	.00790	225.7	10 277.8	261.1	.359
.6370	.0420	.00100	295.1	10 277.8	428.8	.228
.6460	.2670	.00670	258.3	10 277.8	288.2	.359
.7030	.4120	.01030	251.7	10 277.8	270.8	.373
.7910	.3370	.00780	236.1	10 277.8	256.9	.359
.8630	.3320	.00670	138.9	10 277.8	217.7	.305
.9340	.2060	.00270	79.9	10 277.8	163.2	.140
.9780	.1030	.00076	62.5	10 277.8	86.8	.074

(b) Model rotor-blade rotating natural frequencies predicted via CAMRAD

Modal identity	ω/Ω (a)
Flap	2.86
Flap	5.71
Chord	8.46
Flap	9.90

^a $\Omega = 69.32$ rad/sec.

Table 5. Lock Number and Tunnel Operating Densities for Baseline and Advanced Stiff Rotors

Blade set (a)	ρ , slugs/ft ³	I_b , slug-ft ²	M_T	γ	Table
Baseline (0.00469)	0.0023	0.4383	0.285	4.58	7(a)
	.00382		.65	7.61	7(b)
	.00469		.65	9.35	7(c)
	.006		.65	11.95	7(d)
	.0075		.65	14.94	7(e)
	.009		.65	17.93	7(f)
Baseline (0.006)	0.006	0.5602	0.628	9.35	8(a)
	.006	.5602	.65	9.35	8(b)
Baseline (0.0076)	0.0076	0.7092	0.628	9.35	9(a)
	.0076	.7092	.65	9.35	9(b)
Advanced (0.00382)	0.0023	0.4186	0.284	5.89	11(a)
	.00382		.65	9.78	11(b)
	.006		.65	15.36	11(c)
	.0075		.65	19.20	11(d)
	.009		.65	23.04	11(e)
Advanced (0.006)	0.006	0.6735	0.628	9.55	12(a)
	.006		.65	9.55	12(b)
	.009		.628	14.32	12(c)
	.009		.65	14.32	12(d)

^aDesign tunnel operating density is given in parentheses.

Table 6. Lock Number and Tunnel Operating Densities for Baseline and Advanced Elastic Rotors

Blade set (a)	ρ , slugs/ft ³	I_b , slug-ft ²	M_T or masses added	γ	Table
Baseline (0.006)	0.006	0.5602	0.628	9.30	10(a)
	.006	.5602		9.30	10(b)
Advanced (0.006)	0.00382	0.6735	0.65	6.08	13(a)
	.006	.6735		9.55	13(b)
	.006	.6735		9.55	13(c)
Advanced (modal shaping)	0.006	0.6735	5 masses @ 60% radius	9.55	14(a)
	.006	.6735	3 masses @ 60% radius	9.55	14(b)
	.006	.6735	7 masses @ 60% radius	9.55	14(c)

^aDesign tunnel operating density is given in parentheses.

Table 7. Rotor Performance Data for Baseline Stiff Blade Set With
 $I_b = 0.4383 \text{ slug-ft}^2$

(a) $\rho = 0.0023 \text{ slug/ft}^3$ (atmospheric air); $M_T = 0.285$; $\gamma = 4.58$

RUN	12	HOVER			
POINT	A ₁	B ₁	θ	C _T	C _Q
220	.1	.1	2.0	.00057	.00012
221	.1	.1	4.0	.00150	.00014
222	.1	.1	6.0	.00248	.00019
223	.2	.1	8.0	.00374	.00027
224	.2	.1	9.9	.00509	.00038
225	.2	.1	12.0	.00663	.00052
227	.3	.1	16.0	.00966	.00091
228	.2	.1	18.0	.01110	.00115
229	.2	.1	18.9	.01193	.00128
230	.2	.1	19.9	.01252	.00143
231	.2	.1	21.0	.01306	.00162
232	.3	.2	17.9	.01118	.00116
234	.3	.2	14.0	.00813	.00072
235	.4	.2	10.0	.00520	.00040
236	.3	.3	6.0	.00260	.00020

(b) $\rho = 0.00382 \text{ slug/ft}^3$; $M_T = 0.65$; $\gamma = 7.61$

RUN	46	HOVER			
POINT	A ₁	B ₁	θ	C _T	C _Q
1292	-.3	-.1	2.0	.00142	.00015
1293	-.4	.1	4.0	.00234	.00019
1294	-.5	.1	6.0	.00357	.00026
1295	-.5	.2	7.9	.00483	.00036
1296	-.6	.3	9.9	.00620	.00049
1297	-.6	.1	12.0	.00761	.00066
1298	-.8	.3	13.9	.00912	.00085
1299	-.7	.0	15.9	.01059	.00111
1300	-.6	.3	14.0	.00923	.00087
1301	-.5	.4	11.9	.00779	.00067
1302	-.6	-.1	10.0	.00635	.00051
1303	-.6	.0	7.9	.00493	.00038
1304	-.5	.4	5.9	.00372	.00027

Table 7. Continued

(b) Continued

RUN	8								
POINT	α_S	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
118	-1.8	-1.4	1.1	4.2	.156	.756	.00263	-.00001	.00013
119	-1.8	-2.0	1.6	6.2	.155	.757	.00425	-.00006	.00018
120	-1.8	-2.8	1.9	8.3	.154	.756	.00589	-.00012	.00025
121	-1.8	-3.1	2.3	9.3	.153	.757	.00668	-.00015	.00030
122	-1.8	-3.5	2.6	10.0	.155	.758	.00718	-.00019	.00034
123	-1.8	-4.3	2.9	12.1	.153	.757	.00864	-.00025	.00046
124	-1.8	-4.8	3.5	14.0	.154	.756	.00994	-.00031	.00062
125	-1.8	-5.8	4.1	16.0	.155	.758	.01095	-.00042	.00085
126	-3.4	-3.1	3.3	9.6	.205	.792	.00660	-.00029	.00032
127	-3.4	-3.4	3.3	10.0	.205	.792	.00697	-.00030	.00035
128	-3.4	-4.0	4.0	12.0	.203	.791	.00835	-.00040	.00046
129	-3.4	-4.8	4.7	14.1	.203	.790	.00973	-.00052	.00062
130	-3.4	-5.8	5.7	16.0	.206	.791	.01059	-.00069	.00084
131	-3.3	-2.3	2.9	8.2	.207	.792	.00559	-.00018	.00026
132	-3.3	-1.7	2.0	6.3	.210	.794	.00403	-.00008	.00019
133	-3.3	-1.1	1.5	4.1	.208	.793	.00218	.00002	.00014
134	-5.2	-3.3	4.3	10.7	.255	.825	.00650	-.00048	.00038
135	-5.2	-3.8	4.8	12.3	.254	.824	.00770	-.00058	.00047
136	-5.2	-4.7	5.6	14.2	.253	.824	.00894	-.00072	.00062
137	-5.3	-5.6	6.6	16.1	.254	.824	.00976	-.00090	.00083
141	-5.2	-.4	1.8	4.0	.256	.826	.00118	.00007	.00014
RUN	9								
POINT	α_S	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
145	-6.2	-3.5	5.5	11.9	.307	.852	.00657	-.00058	.00044
146	-6.2	-4.5	6.6	13.8	.307	.850	.00784	-.00075	.00057
147	-6.2	-5.5	7.4	15.9	.307	.850	.00899	-.00093	.00077
148	-6.2	-2.1	4.7	10.0	.307	.850	.00533	-.00037	.00033
149	-6.2	-2.4	4.6	9.9	.307	.850	.00526	-.00038	.00033
150	-6.2	-1.6	3.7	8.0	.307	.850	.00375	-.00021	.00024
151	-6.2	-.9	2.7	5.9	.306	.849	.00220	-.00002	.00017
152	-9.2	-4.0	7.0	14.4	.355	.888	.00649	-.00083	.00064
153	-9.2	-4.6	7.7	15.9	.353	.888	.00741	-.00097	.00076
154	-9.1	-2.8	5.6	11.7	.354	.888	.00457	-.00047	.00043
155	-9.1	-1.7	4.8	9.8	.352	.888	.00330	-.00022	.00032
156	-9.1	-1.0	3.6	7.8	.352	.888	.00183	.00003	.00021
157	-11.7	-4.8	8.4	17.3	.401	.923	.00641	-.00106	.00086
158	-11.7	-5.3	8.7	18.3	.402	.924	.00716	-.00123	.00098
159	-11.7	-5.9	9.3	19.4	.401	.924	.00774	-.00139	.00112
160	-11.8	-3.6	7.6	16.1	.400	.923	.00582	-.00090	.00073
161	-11.7	-2.7	6.4	13.9	.399	.922	.00439	-.00060	.00054
162	-11.7	-1.8	5.5	11.8	.401	.923	.00283	-.00027	.00036

Table 7. Continued

(b) Continued

RUN	43	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
		1198	.0	-2.2	1.2	2.0	.154	.752	.00282	.00004	.00012
		1199	.0	-2.8	1.5	4.0	.154	.752	.00434	.00002	.00015
		1200	.0	-3.5	1.9	6.0	.151	.749	.00582	.00001	.00021
		1201	.0	-4.2	2.3	8.0	.149	.748	.00730	-.00001	.00030
		1202	.0	-4.9	2.7	10.0	.154	.752	.00865	-.00005	.00041
		1203	.0	-5.8	3.3	12.0	.151	.749	.00987	-.00010	.00057
		1204	.0	-6.9	3.9	14.0	.152	.750	.01084	-.00022	.00079
		1205	.0	-8.2	4.6	16.0	.157	.754	.01144	-.00038	.00107
		1206	-5.0	-7.3	4.6	16.0	.152	.750	.01070	-.00121	.00106
		1207	-5.0	-6.1	3.8	14.0	.155	.753	.00999	-.00099	.00080
		1208	-5.0	-5.0	3.3	12.0	.153	.752	.00894	-.00080	.00059
		1209	-5.0	-4.3	2.7	10.0	.152	.750	.00768	-.00065	.00045
		1210	-5.0	-3.7	2.3	8.0	.153	.752	.00631	-.00051	.00034
		1211	-5.0	-3.0	1.9	6.0	.155	.753	.00484	-.00038	.00025
		1212	-5.0	-2.4	1.5	4.0	.158	.755	.00335	-.00025	.00018
RUN	44	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
		1216	.0	-2.7	2.4	4.1	.204	.784	.00444	.00002	.00014
		1217	.0	-3.4	3.0	6.0	.202	.783	.00594	-.00001	.00020
		1218	.0	-4.2	3.5	8.0	.201	.782	.00745	-.00004	.00028
		1219	.0	-5.1	4.3	10.0	.201	.782	.00876	-.00009	.00039
		1220	.0	-6.0	5.0	12.0	.202	.783	.00988	-.00019	.00055
		1221	.0	-7.2	5.9	14.0	.200	.781	.01065	-.00034	.00077
		1222	-5.0	-6.3	5.5	14.0	.202	.782	.00982	-.00104	.00077
		1225	-5.0	-4.3	4.0	10.0	.204	.785	.00754	-.00063	.00043
		1226	-5.0	-3.6	3.4	8.0	.204	.785	.00612	-.00048	.00033
		1227	-5.0	-2.8	2.9	6.1	.204	.785	.00465	-.00033	.00024
		1228	.0	-3.4	3.9	6.0	.255	.818	.00582	.00004	.00019
		1229	.0	-4.2	4.6	8.0	.254	.817	.00727	.00000	.00026
		1230	.0	-5.2	5.5	10.1	.254	.817	.00861	-.00006	.00038
		1231	.0	-6.4	6.5	12.0	.255	.818	.00954	-.00021	.00056
		1232	.0	-7.6	7.6	14.0	.252	.817	.01019	-.00039	.00082
		1233	-7.5	-6.0	6.4	14.1	.254	.818	.00883	-.00123	.00075
		1234	-7.5	-7.4	7.4	16.0	.254	.818	.00949	-.00150	.00103
		1237	-7.5	-3.9	4.8	10.0	.254	.818	.00631	-.00077	.00045
		1238	-7.5	-3.2	4.0	8.0	.253	.818	.00492	-.00055	.00034
		1239	-7.9	-2.9	4.6	8.0	.303	.851	.00407	-.00043	.00032
		1240	-7.9	-3.9	5.4	10.0	.303	.851	.00542	-.00066	.00043
		1241	-8.0	-4.8	6.4	12.0	.302	.850	.00675	-.00087	.00056
		1242	-7.9	-5.8	7.3	14.0	.302	.850	.00797	-.00109	.00072
		1243	-8.0	-7.3	8.2	16.0	.302	.850	.00876	-.00136	.00097
		1244	.0	-5.2	6.6	10.0	.304	.849	.00813	-.00004	.00037
		1245	.0	-3.3	4.6	6.0	.305	.850	.00546	.00005	.00019

Table 7. Continued

(b) Concluded

RUN 44

POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1246	.0	-4.2	5.6	8.0	.304	.849	.00685	.00001	.00026
1247	.0	-6.3	7.6	12.0	.304	.849	.00908	-.00019	.00054
1248	.0	-7.0	8.2	13.0	.304	.849	.00944	-.00030	.00067
1249	-5.0	-4.2	6.6	10.0	.356	.884	.00576	-.00042	.00041
1250	-5.0	-5.2	7.7	12.0	.356	.884	.00693	-.00057	.00053
1251	-5.0	-6.5	8.6	14.1	.356	.884	.00803	-.00075	.00071
1252	-5.0	-8.0	9.5	16.1	.356	.883	.00876	-.00098	.00099
1253	-8.0	-4.5	7.5	12.1	.403	.916	.00507	-.00054	.00052
1256	-8.0	-6.8	9.5	16.0	.404	.915	.00742	-.00095	.00088
1257	-8.0	-7.6	9.9	17.0	.404	.914	.00788	-.00109	.00103
1258	-8.0	-4.7	4.4	12.1	.202	.782	.00817	-.00112	.00060
1259	-5.0	-5.2	4.7	12.0	.204	.783	.00878	-.00078	.00057
1260	-5.0	-6.4	5.5	14.0	.203	.782	.00977	-.00099	.00078
1261	-5.0	-4.4	4.0	10.1	.203	.783	.00751	-.00063	.00044

(c) $\rho = 0.00469 \text{ slug/ft}^3$; $M_T = 0.65$; $\gamma = 9.35$

RUN 47 HOVER

POINT	A ₁	B ₁	θ	C _T	C _Q
1308	-.1	.0	2.1	.00145	.00015
1309	-.3	.3	4.0	.00239	.00019
1310	-.5	.0	6.0	.00352	.00026
1311	-.7	.3	8.0	.00468	.00036
1312	-.7	.4	10.0	.00609	.00048
1313	-.6	.5	12.0	.00742	.00063
1314	-.9	.3	14.0	.00875	.00081
1315	-.9	.4	15.0	.00951	.00092
1316	-.7	.5	14.0	.00873	.00081
1317	-.3	.3	12.0	.00744	.00063
1318	-.4	.2	10.0	.00612	.00049
1319	-.4	.2	8.0	.00474	.00036
1321	-.5	.1	6.0	.00350	.00027

Table 7. Continued

(c) Continued

RUN	41	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1074	.0	-2.1	1.3	2.0	.152	.755	.00262	.00004	.00013		
1075	.0	-2.7	1.6	4.0	.151	.754	.00410	.00003	.00016		
1076	.0	-3.4	1.9	6.0	.151	.754	.00559	.00002	.00022		
1077	.0	-4.1	2.2	8.0	.151	.754	.00703	.00000	.00030		
1078	.0	-4.8	2.5	10.0	.151	.754	.00842	-.00002	.00041		
1079	.0	-5.5	3.0	12.0	.151	.754	.00961	-.00006	.00055		
1080	.0	-6.5	3.3	14.0	.152	.754	.01066	-.00014	.00073		
1081	.0	-7.1	3.6	15.0	.152	.754	.01109	-.00019	.00084		
1082	-1.8	-5.3	2.9	12.0	.149	.753	.00926	-.00031	.00056		
1083	-1.8	-6.3	3.3	14.0	.151	.754	.01034	-.00043	.00074		
1084	-1.8	-6.9	3.6	15.0	.152	.754	.01075	-.00051	.00085		
1085	-1.8	-4.6	2.6	10.0	.151	.754	.00803	-.00023	.00044		
1086	-1.8	-3.9	2.2	8.0	.151	.754	.00671	-.00017	.00033		
1087	-1.8	-3.2	1.9	6.0	.153	.755	.00529	-.00011	.00025		
1088	-1.8	-2.5	1.6	4.0	.153	.755	.00382	-.00005	.00020		
1089	-1.8	-1.9	1.3	2.0	.155	.756	.00236	.00001	.00016		
1090	-5.0	-2.2	1.5	4.0	.153	.755	.00324	-.00019	.00021		
1092	-5.0	-3.6	2.2	8.0	.149	.753	.00610	-.00046	.00036		
1093	-5.0	-3.6	2.2	8.0	.150	.753	.00610	-.00046	.00036		
1094	-5.0	-4.3	2.5	10.0	.153	.755	.00747	-.00059	.00046		
1095	-5.0	-5.0	2.9	12.1	.149	.753	.00879	-.00072	.00060		
1096	-5.0	-5.9	3.2	14.0	.153	.755	.00989	-.00089	.00076		
1097	-5.0	-6.4	3.5	15.0	.152	.754	.01033	-.00097	.00086		
1098	-5.0	-5.1	4.3	12.0	.203	.788	.00858	-.00071	.00056		
1099	-5.0	-6.2	4.9	14.0	.202	.788	.00974	-.00088	.00073		
1100	-5.0	-7.5	5.5	16.0	.201	.787	.01047	-.00108	.00097		
1101	-5.0	-4.3	3.7	10.0	.203	.788	.00726	-.00055	.00045		
1102	-5.0	-3.5	3.2	8.0	.204	.789	.00589	-.00040	.00035		
1103	-5.0	-2.7	2.7	6.0	.205	.790	.00438	-.00024	.00026		
1104	-5.0	-1.9	2.2	4.0	.205	.790	.00298	-.00010	.00020		
1105	-3.3	-1.5	1.7	2.1	.204	.789	.00190	.00005	.00016		
1106	-3.3	-2.2	2.3	4.0	.204	.789	.00336	-.00006	.00019		
1107	-3.3	-2.9	2.8	6.0	.205	.790	.00485	-.00018	.00025		
1108	-3.3	-3.7	3.3	8.0	.204	.788	.00632	-.00029	.00033		
1109	-3.3	-4.5	3.9	10.0	.203	.787	.00774	-.00040	.00042		
1110	-3.3	-5.3	4.4	12.0	.202	.786	.00898	-.00053	.00055		
1111	-3.3	-6.5	5.0	14.0	.202	.786	.01001	-.00069	.00072		
1112	-3.3	-7.8	5.8	16.0	.203	.787	.01068	-.00088	.00096		
1113	-3.1	-3.8	3.3	8.3	.205	.788	.00663	-.00030	.00033		
1114	.0	-1.8	1.9	2.0	.206	.789	.00267	.00010	.00013		
1115	.0	-2.5	2.4	4.0	.205	.788	.00427	.00008	.00016		
1116	.0	-3.2	2.8	6.0	.204	.788	.00579	.00005	.00021		
1117	.0	-4.1	3.4	8.0	.205	.788	.00723	.00000	.00028		
1118	.0	-4.9	3.9	10.0	.204	.788	.00860	-.00004	.00038		
1119	.0	-5.9	4.5	12.0	.203	.787	.00977	-.00013	.00052		
1120	.0	-7.0	5.2	14.0	.203	.787	.01065	-.00025	.00071		

Table 7. Continued

(c) Continued

RUN	41	(cont)							
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1121	.0	-7.7	5.6	15.0	.203	.787	.01098	-.00034	.00083
1122	.0	-6.1	5.9	11.9	.255	.821	.00942	-.00015	.00049
1123	.0	-7.4	6.8	14.0	.254	.821	.01019	-.00031	.00071
1124	.0	-5.0	5.1	10.0	.254	.821	.00833	-.00006	.00035
1125	.1	-4.1	4.4	8.0	.254	.821	.00702	.00000	.00025
1126	.1	-3.2	3.7	6.0	.255	.822	.00557	.00003	.00019
1127	.1	-2.3	3.0	4.1	.254	.821	.00412	.00007	.00014
1128	.1	-1.5	2.3	2.0	.255	.821	.00257	.00010	.00011
RUN	42								
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1135	-5.2	-1.7	2.7	4.0	.251	.819	.00246	-.00009	.00017
1136	-5.2	-2.5	3.4	6.0	.252	.820	.00392	-.00025	.00023
1137	-5.2	-3.4	4.0	8.0	.250	.819	.00536	-.00041	.00031
1138	-3.9	-4.0	4.5	9.1	.250	.818	.00661	-.00039	.00036
1139	-5.2	-4.2	4.7	10.0	.250	.819	.00677	-.00056	.00041
1140	-5.2	-5.2	5.4	12.0	.249	.818	.00805	-.00072	.00053
1141	-5.2	-6.2	6.1	14.0	.248	.818	.00915	-.00088	.00069
1142	-5.2	-7.7	6.8	16.0	.248	.817	.00991	-.00111	.00094
1143	-7.5	-4.7	5.2	12.0	.249	.818	.00744	-.00092	.00056
1144	-7.5	-5.8	5.8	13.9	.248	.817	.00867	-.00113	.00071
1145	-7.5	-7.1	6.6	16.0	.248	.818	.00953	-.00136	.00093
1146	-7.5	-3.8	4.5	10.0	.247	.818	.00609	-.00069	.00044
1147	-7.5	-3.0	3.8	7.9	.247	.817	.00468	-.00047	.00034
1148	-7.5	-2.2	3.1	5.9	.247	.817	.00321	-.00025	.00025
1149	-7.9	-1.9	3.5	5.9	.300	.852	.00238	-.00011	.00023
1150	-8.0	-2.7	4.4	7.9	.300	.852	.00378	-.00034	.00032
1151	-8.0	-3.7	5.2	10.0	.301	.852	.00516	-.00057	.00043
1152	-8.0	-4.7	6.0	12.0	.302	.852	.00649	-.00079	.00055
1153	-8.0	-5.7	6.8	13.9	.302	.853	.00769	-.00101	.00069
1154	-8.0	-7.1	7.5	16.0	.302	.853	.00870	-.00126	.00090
1155	-6.2	-5.0	6.3	12.0	.304	.854	.00704	-.00067	.00054
1156	-6.2	-6.1	7.0	14.0	.304	.853	.00820	-.00085	.00068
1157	-6.2	-7.6	7.8	16.0	.303	.851	.00907	-.00108	.00092
1158	-6.1	-4.5	5.9	11.2	.303	.852	.00654	-.00057	.00049
1159	-6.2	-4.0	5.4	10.0	.303	.852	.00574	-.00048	.00042
1160	-6.2	-3.0	4.6	8.0	.302	.851	.00442	-.00031	.00033
1161	-6.2	-2.1	3.8	6.0	.302	.851	.00304	-.00012	.00024
1162	.0	-2.0	3.7	4.0	.304	.851	.00376	.00015	.00016
1164	.0	-3.0	4.5	6.0	.304	.852	.00522	.00008	.00020
1165	.0	-4.0	5.4	8.0	.304	.851	.00659	.00003	.00027
1166	.0	-5.0	6.2	9.9	.305	.852	.00784	-.00003	.00035
1167	.0	-6.2	7.1	12.0	.306	.853	.00890	-.00014	.00049

Table 7. Continued

(c) Concluded

RUN	42	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1168	.0	-6.9	7.5	13.0	.306	.853	.00935	.00022	.00059		
1169	.0	-7.5	8.0	14.0	.305	.852	.00973	.00030	.00070		
1170	-5.0	-1.9	4.4	6.0	.352	.885	.00289	.00004	.00023		
1171	-5.0	-2.9	5.3	7.9	.353	.886	.00418	.00020	.00031		
1172	-5.0	-4.0	6.1	9.9	.353	.886	.00549	.00035	.00041		
1173	-5.0	-5.1	7.1	12.0	.354	.885	.00671	.00051	.00052		
1174	-5.0	-6.2	8.0	13.9	.353	.885	.00782	.00066	.00066		
1175	-5.0	-7.8	8.7	15.9	.354	.885	.00868	.00086	.00090		
1176	-9.2	-4.4	6.5	12.0	.350	.885	.00517	.00070	.00053		
1177	-7.8	-5.3	7.2	13.5	.352	.885	.00661	.00080	.00064		
1178	-9.1	-5.4	7.1	13.9	.350	.885	.00647	.00091	.00068		
1179	-9.1	-6.6	8.0	15.9	.350	.883	.00765	.00115	.00086		
1180	-9.1	-7.4	8.2	17.0	.350	.885	.00815	.00128	.00098		
1182	-9.1	-2.2	4.6	8.0	.349	.884	.00264	.00015	.00029		
1183	-7.9	-2.0	5.1	7.9	.400	.918	.00241	.00003	.00027		
1184	-7.9	-3.1	6.1	10.0	.402	.919	.00359	.00019	.00038		
1185	-7.9	-4.1	7.0	12.0	.401	.917	.00485	.00040	.00051		
1186	-7.9	-5.3	7.9	14.0	.402	.918	.00612	.00062	.00066		
1187	-7.9	-6.7	8.8	15.9	.402	.918	.00715	.00083	.00084		
1188	-8.0	-7.4	9.1	17.0	.402	.918	.00775	.00094	.00096		
1189	-11.8	-2.2	5.4	9.9	.397	.918	.00219	.00009	.00031		
1191	-11.8	-4.5	7.2	14.0	.398	.918	.00455	.00072	.00061		
1192	-11.8	-5.8	8.0	15.9	.398	.918	.00576	.00103	.00080		
1193	-10.3	-6.4	8.4	16.3	.400	.918	.00654	.00106	.00086		
1194	-11.7	-6.4	8.4	16.9	.398	.919	.00643	.00121	.00091		

Table 7. Continued

(d) $\rho = 0.006 \text{ slug/ft}^3$; $M_T = 0.65$; $\gamma = 11.95$

RUN	10	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
		166	-1.9	-3.2	1.9	9.9	.153	.751	.00658	-.00015	.00031
		167	-1.9	-4.0	2.3	12.1	.154	.750	.00803	-.00022	.00041
		168	-1.9	-4.6	2.6	14.1	.153	.751	.00925	-.00026	.00053
		169	-1.9	-3.0	1.8	7.9	.153	.751	.00507	-.00013	.00023
		170	-1.9	-1.9	1.5	6.2	.153	.751	.00385	-.00005	.00019
		171	-1.9	-1.2	1.3	4.1	.157	.752	.00227	.00000	.00015
		172	-3.3	-3.4	2.7	10.3	.202	.782	.00653	-.00031	.00032
		173	-3.3	-4.0	3.3	12.1	.201	.782	.00768	-.00040	.00041
		174	-3.3	-4.8	3.7	14.1	.201	.781	.00896	-.00050	.00052
		175	-3.3	-5.1	3.8	15.0	.199	.781	.00956	-.00053	.00058
		176	-3.3	-5.6	3.9	15.9	.199	.781	.01006	-.00058	.00065
		177	-3.3	-5.9	4.2	17.0	.198	.780	.01057	-.00062	.00075
		178	-3.3	-2.2	2.6	7.9	.201	.782	.00470	-.00019	.00023
		179	-3.3	-1.5	2.0	6.1	.204	.783	.00335	-.00009	.00018
		180	-3.3	-.8	1.6	4.1	.203	.783	.00183	.00002	.00014
		184	-5.2	-2.8	3.7	11.3	.253	.815	.00637	-.00045	.00036
		185	-5.2	-3.7	3.8	12.1	.253	.816	.00681	-.00053	.00039
		186	-5.2	-4.3	4.7	14.2	.254	.815	.00824	-.00069	.00051
		187	-5.2	-5.6	5.3	16.1	.253	.815	.00923	-.00086	.00065
		188	-5.2	-6.1	5.6	16.9	.252	.814	.00960	-.00093	.00073
RUN	11	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
		193	-5.2	-2.6	3.7	10.0	.253	.821	.00485	-.00035	.00029
		194	-5.2	-1.7	3.1	8.0	.253	.823	.00336	-.00018	.00021
		195	-6.2	-2.0	4.1	10.0	.304	.855	.00397	-.00028	.00029
		196	-6.2	-3.1	4.8	12.0	.304	.856	.00526	-.00046	.00038
		197	-6.2	-3.6	5.2	13.0	.306	.857	.00592	-.00056	.00043
		198	-6.2	-3.9	5.4	13.7	.303	.855	.00644	-.00062	.00047
		199	-6.2	-4.7	5.8	15.0	.304	.856	.00727	-.00075	.00055
		200	-6.2	-5.9	6.4	17.0	.304	.856	.00849	-.00094	.00070
		201	-6.2	-6.6	6.7	18.0	.304	.856	.00895	-.00103	.00079
		206	-9.1	-3.8	6.0	14.9	.350	.889	.00551	-.00071	.00056
		207	-9.2	-4.4	6.3	16.0	.351	.890	.00614	-.00083	.00063
		208	-8.8	-4.5	6.4	16.3	.350	.890	.00652	-.00084	.00065
		209	-9.2	-5.1	6.6	16.9	.353	.889	.00669	-.00095	.00070
		210	-9.2	-5.4	6.6	17.5	.352	.891	.00706	-.00100	.00074
		211	-11.7	-3.5	6.4	16.0	.396	.923	.00433	-.00060	.00057
		213	-11.8	-4.0	6.8	17.0	.398	.924	.00493	-.00078	.00066
		214	-11.8	-4.8	7.0	17.9	.398	.924	.00549	-.00094	.00075
		215	-11.8	-5.2	7.2	18.4	.398	.924	.00575	-.00102	.00079

Table 7. Continued

(d) Continued

RUN	39								
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1013	.0	-1.9	1.5	1.9	.151	.749	.00226	.00005	.00012
1014	.0	-2.6	1.7	3.9	.151	.748	.00374	.00003	.00015
1017	.0	-4.0	2.1	7.9	.150	.747	.00654	.00000	.00027
1018	.0	-4.7	2.3	9.9	.151	.748	.00786	-.00001	.00036
1019	.0	-5.4	2.6	11.9	.151	.748	.00901	-.00004	.00047
1020	.0	-6.3	2.8	14.0	.152	.749	.01016	-.00008	.00061
1021	.0	-6.8	2.9	14.9	.152	.749	.01064	-.00012	.00070
1022	-5.0	-6.0	3.0	14.9	.150	.748	.00982	-.00090	.00073
1023	-5.0	-5.6	2.8	13.9	.149	.748	.00931	-.00081	.00065
1024	-5.0	-4.7	2.7	11.9	.148	.747	.00814	-.00067	.00052
1025	-5.0	-4.1	2.4	9.9	.147	.746	.00691	-.00055	.00041
1026	-4.9	-3.4	2.1	7.9	.148	.747	.00560	-.00041	.00032
1027	-4.9	-2.7	1.9	6.0	.150	.748	.00429	-.00029	.00024
1028	-4.9	-2.6	2.6	5.9	.202	.782	.00402	-.00025	.00023
1029	-4.9	-3.4	3.0	7.9	.200	.781	.00539	-.00039	.00030
1031	-4.9	-5.0	3.9	11.9	.203	.783	.00801	-.00069	.00050
1032	-5.0	-6.0	4.3	13.9	.201	.782	.00921	-.00085	.00063
1033	.0	-4.8	3.6	9.9	.201	.782	.00799	-.00003	.00034
1034	.0	-5.7	4.0	11.9	.201	.780	.00924	-.00008	.00044
1035	.0	-6.8	4.4	13.9	.201	.781	.01027	-.00017	.00059
1036	.0	-3.9	3.2	7.9	.202	.782	.00668	.00000	.00025
1037	.0	-3.0	2.9	5.9	.203	.783	.00522	.00002	.00019
RUN	40								
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1041	.1	-2.0	3.0	4.0	.255	.817	.00363	.00006	.00013
1042	.1	-3.0	3.6	6.0	.254	.818	.00505	.00001	.00017
1043	.1	-3.9	4.1	8.1	.255	.816	.00652	-.00003	.00023
1044	.1	-4.8	4.7	10.0	.253	.816	.00777	-.00008	.00030
1047	.1	-7.1	5.8	14.0	.255	.815	.00993	-.00025	.00056
1048	-7.4	-5.7	5.3	14.0	.252	.816	.00812	-.00113	.00063
1049	-7.4	-6.9	5.7	16.0	.252	.815	.00919	-.00132	.00079
1050	-7.4	-4.7	4.8	12.0	.253	.817	.00687	-.00090	.00050
1051	-7.4	-3.8	4.2	10.0	.254	.817	.00560	-.00069	.00039
1052	-7.4	-2.8	3.7	8.0	.254	.817	.00423	-.00048	.00030
1053	-7.9	-2.5	4.2	8.0	.302	.849	.00342	-.00035	.00029
1054	-7.9	-3.5	4.8	10.0	.303	.849	.00473	-.00057	.00038
1055	-7.9	-4.5	5.4	12.1	.303	.848	.00604	-.00079	.00050
1056	-7.9	-5.7	6.1	14.1	.302	.849	.00721	-.00102	.00063
1057	-7.9	-7.0	6.7	16.0	.303	.849	.00825	-.00124	.00078
1058	.1	-4.8	5.9	10.0	.305	.849	.00730	-.00007	.00031
1059	.1	-6.0	6.5	12.1	.304	.848	.00847	-.00016	.00041
1060	.1	-7.2	7.1	14.0	.305	.848	.00941	-.00029	.00057

Table 7. Continued

(d) Concluded

RUN 40

POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1061	.1	-3.6	5.1	8.0	.305	.848	.00611	-.00005	.00023
1062	.1	-2.6	4.4	6.1	.305	.848	.00483	.00000	.00018
1063	-4.9	-3.6	5.8	10.0	.354	.881	.00508	-.00039	.00036
1064	-4.9	-4.8	6.6	12.1	.354	.882	.00627	-.00054	.00047
1065	-4.9	-6.1	7.2	14.0	.354	.882	.00734	-.00071	.00059
1066	-4.9	-6.9	7.4	15.0	.353	.881	.00787	-.00079	.00067
1067	-4.9	-7.7	7.6	16.0	.353	.881	.00832	-.00088	.00077
1068	-7.9	-3.7	6.5	12.0	.403	.915	.00442	-.00044	.00047
1069	-7.9	-5.1	7.2	14.0	.403	.915	.00549	-.00066	.00060
1070	-8.0	-6.6	7.8	16.0	.402	.915	.00664	-.00088	.00077

(e) $\rho = 0.0075 \text{ slug/ft}^3$; $M_T = 0.65$; $\gamma = 14.94$

RUN 13

POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
241	-1.8	-3.3	2.1	10.9	.151	.757	.00647	-.00016	.00030
242	-1.8	-3.8	2.2	12.0	.151	.755	.00722	-.00020	.00035
243	-1.8	-4.5	2.4	14.0	.151	.756	.00844	-.00025	.00045
244	-1.8	-4.6	2.5	14.5	.152	.757	.00873	-.00027	.00048
245	-1.8	-3.0	2.1	10.0	.153	.758	.00593	-.00014	.00027
246	-1.8	-2.1	2.0	8.0	.154	.758	.00452	-.00008	.00021
248	-1.8	-1.4	1.9	6.0	.152	.761	.00304	-.00002	.00016
249	-2.9	-3.1	3.1	11.3	.204	.795	.00640	-.00028	.00031
250	-3.3	-3.4	3.2	12.0	.203	.793	.00678	-.00035	.00035
251	-3.3	-3.6	3.3	12.6	.202	.794	.00711	-.00038	.00037
252	-3.3	-3.8	3.4	13.0	.203	.793	.00742	-.00040	.00039
253	-3.3	-4.0	3.5	13.5	.203	.793	.00771	-.00043	.00042
254	-3.3	-4.4	3.6	14.2	.202	.794	.00815	-.00047	.00045
255	-3.3	-4.5	3.7	14.6	.202	.793	.00839	-.00049	.00047
256	-3.3	-2.7	3.0	10.5	.205	.795	.00577	-.00027	.00029
257	-3.3	-1.8	2.7	8.5	.204	.794	.00434	-.00015	.00022
258	-3.3	-2.3	2.8	9.5	.204	.794	.00508	-.00021	.00025
259	-3.3	-2.7	3.0	10.6	.204	.794	.00579	-.00027	.00028
260	-4.6	-3.2	4.2	12.5	.254	.827	.00633	-.00046	.00036
261	-5.2	-3.6	4.4	13.6	.252	.827	.00683	-.00059	.00042
262	-5.2	-4.2	4.6	14.5	.252	.827	.00742	-.00067	.00047
264	-5.2	-2.6	3.9	11.6	.253	.828	.00549	-.00042	.00033
265	-5.2	-2.2	3.7	10.6	.252	.828	.00481	-.00034	.00029
266	-5.2	-1.6	3.4	9.5	.253	.828	.00418	-.00026	.00025
267	-5.2	-4.7	4.8	15.5	.253	.828	.00799	-.00075	.00052

Table 7. Continued

(e) Continued

RUN	14	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
		271	-6.1	-3.7	5.3	14.2	.302	.862	.00632	-.00061	.00045
		272	-6.2	-4.1	5.5	15.1	.303	.861	.00683	-.00070	.00050
		273	-6.2	-4.7	5.7	16.1	.302	.861	.00738	-.00078	.00056
		274	-6.2	-3.2	5.1	13.5	.302	.861	.00587	-.00055	.00042
		275	-6.2	-2.4	4.7	12.1	.302	.861	.00498	-.00042	.00036
		276	-6.2	-1.8	4.3	11.0	.303	.862	.00436	-.00031	.00031
		277	-8.5	-4.5	6.2	16.8	.350	.894	.00630	-.00083	.00063
		278	-9.2	-4.8	6.2	17.5	.349	.894	.00650	-.00094	.00068
		279	-9.2	-5.4	6.3	18.0	.352	.888	.00684	-.00101	.00073
		280	-9.2	-3.4	5.6	15.0	.350	.893	.00517	-.00066	.00053
		281	-9.2	-2.7	5.3	14.0	.350	.893	.00463	-.00053	.00047
		282	-9.2	-2.1	5.1	13.1	.350	.893	.00407	-.00042	.00042
		283	-11.7	-4.7	6.5	18.2	.400	.922	.00524	-.00090	.00072
		284	-11.7	-3.7	6.3	17.1	.396	.925	.00464	-.00073	.00062
		285	-11.7	-2.9	6.0	16.0	.395	.925	.00406	-.00058	.00054
		286	-11.7	-2.3	5.8	14.9	.395	.927	.00342	-.00042	.00046
RUN	37	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
		933	.0	-1.9	1.6	1.9	.145	.748	.00201	.00006	.00012
		934	.0	-2.6	1.6	4.0	.144	.748	.00336	.00004	.00015
		935	.0	-3.2	1.8	5.9	.144	.748	.00468	.00002	.00019
		936	.0	-4.0	1.9	7.9	.141	.746	.00598	.00000	.00025
		937	.0	-4.7	1.9	9.9	.144	.747	.00735	-.00001	.00033
		938	.0	-5.5	2.1	12.0	.144	.747	.00849	-.00004	.00043
		939	.0	-5.8	2.1	12.9	.141	.746	.00900	-.00004	.00048
		940	-5.0	-2.1	1.6	4.0	.144	.748	.00267	-.00018	.00017
		941	-5.0	-2.7	1.7	5.9	.143	.747	.00395	-.00030	.00022
		942	-5.0	-3.5	1.9	7.9	.142	.747	.00523	-.00043	.00029
		943	-5.0	-4.2	2.0	9.9	.142	.747	.00650	-.00055	.00038
		944	-5.0	-4.9	2.1	11.9	.142	.747	.00766	-.00066	.00047
		945	-5.1	-5.2	2.1	12.9	.142	.747	.00818	-.00072	.00053
		946	-5.0	-1.7	2.2	3.9	.197	.782	.00235	-.00009	.00017
		947	-5.0	-2.4	2.6	5.9	.196	.781	.00371	-.00024	.00022
		948	-5.0	-3.2	2.9	7.9	.195	.781	.00504	-.00038	.00028
		950	-5.0	-4.1	3.1	9.9	.195	.781	.00630	-.00053	.00036
		951	-5.0	-5.0	3.4	11.9	.195	.780	.00747	-.00067	.00046
		952	-5.0	-6.0	3.5	13.9	.193	.780	.00865	-.00081	.00057
		953	.0	-1.4	2.1	1.9	.197	.781	.00205	.00011	.00013
		954	.0	-2.2	2.4	4.0	.197	.781	.00351	.00007	.00015
		955	.0	-3.0	2.6	5.9	.196	.780	.00488	.00003	.00018
		957	.0	-3.9	3.0	7.9	.196	.780	.00617	-.00002	.00024
		958	.0	-4.7	3.2	9.9	.195	.780	.00742	-.00006	.00031
		959	.0	-5.6	3.5	11.9	.196	.780	.00861	-.00010	.00040

Table 7. Continued

(e) Concluded

RUN 37

POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
960	.0	-6.0	3.6	12.9	.196	.780	.00916	-.00013	.00045
961	.0	-1.7	3.0	3.9	.248	.813	.00327	.00008	.00014
962	.0	-2.7	3.5	5.9	.249	.814	.00464	.00003	.00017
963	.0	-3.7	3.9	7.9	.249	.814	.00598	-.00002	.00022
964	.0	-4.7	4.4	9.9	.249	.814	.00720	-.00008	.00029
965	.0	-5.7	4.9	11.9	.248	.814	.00835	-.00014	.00038
966	.0	-6.3	5.0	13.0	.248	.813	.00891	-.00018	.00043
967	-7.5	-1.7	3.0	5.9	.247	.813	.00255	-.00023	.00021
968	-7.5	-2.7	3.5	7.9	.248	.814	.00385	-.00044	.00028
969	-7.5	-3.6	3.9	9.9	.247	.814	.00510	-.00064	.00036
970	-7.5	-4.6	4.3	11.9	.247	.813	.00631	-.00084	.00046
971	-7.5	-5.7	4.7	13.9	.247	.814	.00745	-.00105	.00057

RUN 38

POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
975	-7.5	-1.5	3.0	6.0	.247	.812	.00251	-.00021	.00020
977	-7.5	-1.5	3.0	6.0	.248	.812	.00253	-.00021	.00020
978	-7.5	-2.5	3.4	8.0	.248	.812	.00380	-.00042	.00027
979	-7.5	-3.4	3.9	10.0	.249	.812	.00505	-.00061	.00035
980	-7.5	-4.4	4.3	12.0	.249	.812	.00625	-.00082	.00045
981	-7.5	-5.5	4.7	14.0	.248	.812	.00740	-.00103	.00056
982	-8.0	-2.1	3.9	8.0	.298	.845	.00304	-.00028	.00026
983	-8.0	-3.1	4.6	10.0	.298	.845	.00422	-.00050	.00034
984	-8.0	-4.1	5.0	12.0	.299	.844	.00540	-.00071	.00044
987	-8.0	-5.3	5.5	14.1	.299	.844	.00657	-.00092	.00056
988	-8.0	-5.3	5.5	14.1	.298	.843	.00657	-.00092	.00056
989	-8.0	-5.9	5.8	15.1	.299	.843	.00710	-.00103	.00063
990	.0	-1.1	3.5	4.1	.300	.843	.00295	.00015	.00016
991	-.1	-2.1	4.1	6.0	.300	.843	.00424	.00009	.00018
992	-.1	-3.1	4.8	8.0	.300	.843	.00551	.00001	.00023
993	-.1	-4.4	5.4	10.0	.301	.842	.00669	-.00008	.00029
994	-.1	-5.4	5.9	12.1	.301	.842	.00782	-.00015	.00037
995	-.1	-6.8	6.3	14.1	.300	.842	.00878	-.00025	.00048
996	-5.0	-.8	4.2	6.1	.350	.875	.00220	.00003	.00021
997	-5.0	-1.9	4.8	8.0	.351	.875	.00340	-.00013	.00027
999	-5.0	-3.1	5.5	10.0	.350	.877	.00449	-.00029	.00034
1000	-5.0	-4.3	6.0	12.0	.351	.878	.00564	-.00045	.00043
1001	-5.0	-5.7	6.5	14.0	.350	.878	.00664	-.00062	.00054
1002	-5.0	-6.4	6.8	15.0	.351	.878	.00716	-.00071	.00060
1003	-7.9	-2.0	5.5	10.1	.397	.909	.00287	-.00014	.00032
1004	-8.0	-3.3	6.0	12.1	.398	.910	.00399	-.00037	.00043
1005	-8.0	-4.7	6.6	14.0	.398	.910	.00493	-.00058	.00054
1007	-8.0	-5.4	6.9	15.1	.398	.910	.00547	-.00069	.00061

Table 7. Continued

(f) $\rho = 0.009 \text{ slug/ft}^3$; $M_T = 0.65$; $\gamma = 17.93$

RUN	15	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
290	-1.6	-3.6	1.8	11.6	.145	.750	.00645	.00016	.00030		
291	-1.8	-3.6	1.8	12.1	.145	.750	.00675	.00017	.00032		
292	-1.8	-3.6	1.8	13.1	.144	.751	.00734	.00016	.00036		
293	-1.8	-4.3	1.8	13.5	.144	.751	.00754	.00022	.00039		
294	-1.8	-4.6	1.9	13.9	.144	.750	.00774	.00025	.00041		
295	-1.8	-3.1	1.8	10.0	.144	.751	.00549	.00015	.00026		
296	-1.8	-2.3	1.8	8.1	.147	.753	.00424	.00009	.00020		
297	-1.8	-1.5	1.8	6.0	.147	.754	.00289	.00002	.00016		
298	-3.3	-1.3	2.3	7.1	.197	.785	.00318	.00006	.00018		
299	-3.3	-1.6	2.5	8.0	.199	.788	.00377	.00012	.00020		
300	-3.3	-2.6	2.7	10.1	.198	.789	.00511	.00023	.00025		
301	-2.8	-3.6	2.8	12.0	.197	.787	.00644	.00030	.00032		
302	-3.3	-3.6	2.9	12.1	.197	.787	.00632	.00034	.00032		
303	-3.3	-4.5	3.2	14.0	.196	.786	.00746	.00046	.00040		
304	-3.3	-4.6	3.2	14.5	.197	.786	.00776	.00048	.00043		
305	-5.2	-1.0	3.0	8.1	.248	.820	.00298	.00011	.00021		
306	-5.2	-2.0	3.2	10.0	.248	.821	.00424	.00026	.00026		
307	-5.2	-2.5	3.5	11.1	.249	.819	.00485	.00034	.00029		
308	-5.2	-2.9	3.7	12.1	.249	.821	.00548	.00042	.00033		
309	-4.0	-3.7	4.1	13.3	.250	.821	.00647	.00043	.00036		
311	-5.2	-4.0	4.1	14.0	.247	.820	.00656	.00058	.00041		
312	-5.2	-4.5	4.2	15.0	.247	.818	.00711	.00065	.00045		
313	-5.2	-4.8	4.2	15.7	.248	.820	.00750	.00069	.00048		
314	-6.2	-2.4	4.2	12.1	.299	.851	.00463	.00037	.00034		
315	-6.2	-3.0	4.5	13.0	.299	.853	.00510	.00045	.00037		
317	-5.8	-4.2	5.0	15.0	.299	.851	.00630	.00062	.00046		
RUN	16	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
321	-9.1	-.9	4.5	12.0	.345	.884	.00305	.00023	.00033		
322	-9.1	-1.5	4.8	13.0	.347	.883	.00358	.00035	.00038		
323	-9.1	-2.2	5.0	14.0	.346	.882	.00413	.00047	.00043		
324	-9.1	-2.8	5.3	15.0	.346	.884	.00465	.00059	.00047		
325	-9.1	-3.5	5.5	16.0	.346	.883	.00517	.00071	.00053		
326	-9.1	-3.9	5.6	16.5	.348	.882	.00545	.00077	.00056		
327	-11.7	-.2	4.9	13.0	.395	.913	.00211	.00006	.00031		
328	-11.7	-.9	5.2	14.0	.395	.913	.00262	.00021	.00037		
329	-11.7	-1.6	5.5	14.9	.395	.913	.00306	.00034	.00042		
330	-11.8	-2.3	5.7	16.0	.396	.912	.00361	.00049	.00048		
331	-11.8	-2.9	6.0	17.0	.398	.910	.00408	.00062	.00054		

Table 7. Concluded

(f) Concluded

RUN	35	POINT	α_s	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
870	.1	-1.2	1.3	2.1	.146	.748	.00169	.00009	.00013		
871	.1	-1.9	1.4	4.0	.144	.747	.00297	.00007	.00014		
872	.1	-2.6	1.4	6.0	.143	.746	.00429	.00005	.00017		
873	.1	-3.3	1.4	8.1	.141	.749	.00560	.00005	.00023		
874	.1	-4.0	1.6	10.0	.145	.752	.00676	.00003	.00029		
875	.1	-4.3	1.6	11.0	.144	.751	.00739	.00003	.00033		
876	.1	-4.7	1.6	12.0	.144	.750	.00789	.00002	.00038		
877	.0	-4.7	1.7	12.0	.146	.752	.00786	.00001	.00038		
878	-5.0	-1.4	1.4	4.0	.145	.752	.00226	-.00011	.00016		
879	-5.0	-2.1	1.5	6.1	.145	.752	.00355	-.00024	.00020		
880	-5.0	-2.8	1.5	8.0	.144	.751	.00475	-.00036	.00026		
881	-5.0	-3.4	1.6	10.0	.143	.750	.00596	-.00047	.00034		
882	-5.0	-4.2	1.7	12.0	.142	.750	.00711	-.00058	.00042		
883	-5.0	-4.6	1.6	13.0	.145	.752	.00762	-.00064	.00047		
884	-5.0	-2.0	1.5	6.0	.146	.752	.00352	-.00023	.00020		
885	-5.0	-.7	1.9	4.0	.196	.785	.00199	-.00003	.00016		
886	-5.0	-1.6	2.2	6.0	.196	.785	.00332	-.00017	.00020		
887	-5.0	-2.4	2.4	8.0	.196	.785	.00457	-.00031	.00025		
888	-5.0	-3.3	2.6	9.9	.195	.784	.00579	-.00045	.00032		
889	-5.0	-4.1	2.8	12.0	.195	.784	.00698	-.00058	.00041		
890	-5.0	-4.6	2.9	13.1	.196	.785	.00754	-.00065	.00045		
891	-5.0	-5.1	3.0	14.0	.196	.784	.00806	-.00072	.00050		
892	.0	-1.2	2.0	4.0	.197	.786	.00308	.00011	.00014		
894	.0	-2.0	2.2	6.0	.197	.785	.00444	.00008	.00017		
895	.0	-2.9	2.4	8.0	.196	.785	.00573	.00004	.00021		
896	.0	-3.8	2.6	9.9	.196	.785	.00693	.00001	.00027		
897	.0	-4.3	2.7	11.0	.196	.785	.00752	.00000	.00030		
898	.0	-4.6	2.9	12.0	.197	.785	.00808	-.00002	.00034		
899	.0	-.3	1.7	2.0	.198	.786	.00173	.00013	.00013		
900	.0	-.5	2.3	4.0	.248	.819	.00295	.00015	.00015		
901	.0	-1.5	2.8	6.0	.249	.819	.00433	.00010	.00017		
902	.0	-2.4	3.2	8.0	.247	.818	.00561	.00006	.00020		
903	.0	-3.5	3.6	9.9	.247	.819	.00677	.00002	.00025		
904	.0	-4.0	3.8	11.0	.247	.818	.00736	-.00001	.00028		
905	.0	-4.0	3.8	11.0	.247	.818	.00737	-.00001	.00028		
906	.0	-4.5	4.0	12.0	.247	.818	.00790	-.00004	.00032		
907	-7.5	-.7	2.5	6.0	.245	.818	.00232	-.00016	.00019		
908	-7.5	-1.6	2.9	8.0	.245	.818	.00357	-.00036	.00025		
909	-7.5	-2.6	3.3	10.0	.245	.818	.00477	-.00054	.00032		
910	-7.5	-3.6	3.6	12.0	.245	.818	.00593	-.00073	.00041		
911	-7.5	-4.7	3.9	14.0	.246	.818	.00704	-.00092	.00051		
912	-6.2	-3.4	4.5	11.9	.296	.852	.00563	-.00052	.00040		
913	-6.2	-4.0	4.7	13.0	.297	.851	.00619	-.00061	.00044		
914	-6.2	-4.6	4.9	14.0	.298	.851	.00671	-.00070	.00049		

Table 8. Rotor Performance Data for Baseline Stiff Blade Set With
 $I_b = 0.5602 \text{ slug-ft}^2$

(a) $\rho = 0.006 \text{ slug/ft}^3; M_T = 0.628; \gamma = 9.35$

RUN	53	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1439	.0	1439	-1.7	1.3	4.0	.153	.725	.00321	.00004	.00014	
1440	.0	1440	-2.4	1.7	6.0	.152	.724	.00474	.00004	.00018	
1441	.0	1441	-3.0	2.0	8.0	.152	.724	.00626	.00003	.00024	
1442	.0	1442	-3.7	2.4	10.0	.152	.724	.00771	.00002	.00033	
1443	.0	1443	-4.3	2.9	12.0	.152	.724	.00904	.00001	.00043	
1444	.0	1444	-5.0	3.3	13.9	.152	.725	.01029	-.00002	.00057	
1445	.0	1445	-5.4	3.5	15.0	.152	.724	.01092	-.00003	.00065	
1446	-1.9	1446	-3.6	2.4	9.9	.150	.725	.00729	-.00021	.00034	
1447	-1.9	1447	-4.2	2.9	12.0	.153	.726	.00868	-.00027	.00045	
1448	-1.9	1448	-4.8	3.3	14.0	.153	.726	.00992	-.00033	.00058	
1449	-1.9	1449	-5.2	3.5	15.0	.149	.723	.01052	-.00037	.00067	
1450	-1.9	1450	-2.9	2.0	8.0	.153	.726	.00590	-.00015	.00025	
1451	-1.9	1451	-2.3	1.6	6.0	.152	.725	.00439	-.00010	.00019	
1452	-1.9	1452	-1.8	1.2	4.0	.153	.726	.00288	-.00004	.00014	
1453	.0	1453	-.7	2.4	4.0	.304	.821	.00306	.00013	.00011	
1454	.0	1454	-1.5	3.4	5.9	.304	.821	.00452	.00010	.00014	
1455	.0	1455	-2.4	4.2	7.9	.305	.821	.00601	.00007	.00019	
1456	.0	1456	-3.2	5.1	9.9	.303	.820	.00740	.00004	.00025	
1457	.0	1457	-4.2	6.0	11.9	.304	.820	.00867	-.00001	.00035	
1458	.0	1458	-5.2	7.0	14.0	.305	.820	.00978	-.00010	.00051	
1459	-6.2	1459	-.9	2.7	6.0	.302	.820	.00231	-.00010	.00017	
1460	-6.2	1460	-1.7	3.6	8.0	.303	.820	.00373	-.00028	.00024	
1461	-6.2	1461	-2.5	4.5	10.0	.301	.819	.00513	-.00045	.00033	
1462	-6.2	1462	-3.4	5.3	12.0	.302	.820	.00653	-.00062	.00044	
1463	-6.2	1463	-4.4	6.2	14.0	.302	.820	.00780	-.00079	.00056	
1464	-6.2	1464	-5.4	7.0	16.0	.302	.820	.00899	-.00097	.00072	
1465	-6.2	1465	-6.7	7.8	18.0	.302	.820	.00986	-.00118	.00097	
1466	-5.0	1466	-3.2	6.1	11.9	.353	.852	.00629	-.00041	.00042	
1467	-5.0	1467	-4.2	7.0	14.0	.352	.851	.00759	-.00056	.00055	
1468	-5.0	1468	-5.5	7.9	16.0	.352	.850	.00866	-.00072	.00071	
1469	-5.0	1469	-6.1	8.4	17.0	.353	.850	.00914	-.00081	.00083	
1470	-5.0	1470	-2.3	5.1	9.9	.353	.851	.00501	-.00026	.00032	
1471	-5.0	1471	-1.4	4.1	7.9	.352	.851	.00363	-.00011	.00023	
1472	-5.0	1472	-.4	3.1	5.9	.353	.851	.00229	.00003	.00017	
1473	-9.2	1473	-.8	3.5	8.0	.349	.851	.00205	-.00008	.00022	
1474	-9.2	1474	-1.7	4.5	10.0	.350	.851	.00343	-.00034	.00032	
1475	-9.2	1475	-2.6	5.4	12.0	.351	.851	.00475	-.00057	.00044	
1476	-9.2	1476	-3.5	6.3	13.9	.352	.852	.00602	-.00080	.00057	
1477	-9.3	1477	-4.6	7.2	16.0	.351	.851	.00732	-.00104	.00073	
1478	-9.2	1478	-5.2	7.6	17.0	.352	.851	.00794	-.00115	.00082	
1480	-6.2	1480	-5.5	7.0	15.9	.303	.819	.00894	-.00093	.00072	
1481	-6.2	1481	-3.5	5.3	11.9	.303	.819	.00649	-.00058	.00044	
1482	-6.2	1482	-2.6	4.5	9.9	.303	.819	.00509	-.00041	.00034	
1483	-6.2	1483	-1.7	3.6	7.9	.303	.819	.00370	-.00024	.00025	

Table 8. Continued

(b) $\rho = 0.006 \text{ slug/ft}^3$; $M_T = 0.65$; $\gamma = 9.35$

RUN	52	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1380	.0	-2.3	1.7	6.0	.151	.749	.00456	.00009	.00019		
1383	.0	-3.6	2.5	10.0	.149	.747	.00768	.00008	.00034		
1384	.0	-4.2	3.0	12.0	.150	.748	.00905	.00007	.00045		
1385	.0	-4.9	3.5	14.0	.151	.748	.01045	.00004	.00060		
1386	.0	-5.4	3.7	15.0	.151	.748	.01105	.00002	.00069		
1387	.0	-5.9	4.0	16.0	.151	.748	.01159	-.00002	.00080		
1388	.0	-3.0	2.0	8.0	.152	.749	.00637	.00010	.00027		
1389	.0	-1.8	1.2	4.0	.153	.750	.00327	.00011	.00016		
1390	-1.8	-1.6	1.2	4.0	.154	.750	.00289	.00003	.00017		
1391	-1.8	-2.2	1.6	6.0	.153	.750	.00445	-.00002	.00022		
1392	-1.8	-2.9	2.0	8.0	.152	.749	.00597	-.00007	.00028		
1393	-1.8	-3.5	2.4	10.0	.149	.747	.00745	-.00012	.00037		
1394	-1.8	-4.2	3.0	12.0	.152	.749	.00881	-.00019	.00048		
1395	-1.8	-4.9	3.4	14.0	.152	.749	.01010	-.00026	.00062		
1396	-1.8	-5.6	4.0	16.0	.152	.748	.01122	-.00035	.00081		
1397	-5.0	-3.7	2.9	12.0	.152	.750	.00816	-.00059	.00051		
1398	-5.0	-4.4	3.4	14.0	.151	.748	.00952	-.00072	.00065		
1399	-5.0	-5.1	3.8	16.0	.151	.748	.01068	-.00086	.00083		
1400	-5.0	-3.0	2.5	10.0	.152	.749	.00677	-.00044	.00040		
1401	-5.0	-2.4	2.1	8.0	.155	.751	.00528	-.00032	.00031		
1402	-5.0	-1.7	1.7	6.0	.154	.750	.00379	-.00018	.00024		
1403	-5.0	-1.3	1.3	4.0	.155	.751	.00224	-.00005	.00019		
1404	.0	-.1	2.5	4.0	.303	.852	.00302	.00019	.00015		
1405	.0	-1.2	3.4	6.0	.304	.852	.00452	.00016	.00017		
1406	.1	-2.1	4.2	8.0	.305	.852	.00603	.00013	.00022		
1407	.0	-3.1	5.1	10.0	.305	.851	.00742	.00009	.00029		
1408	.1	-4.0	6.1	12.0	.304	.852	.00867	.00004	.00038		
1409	.1	-5.0	7.1	14.0	.303	.851	.00975	-.00005	.00054		
1410	.1	-6.2	8.1	15.0	.303	.851	.01052	-.00018	.00077		
1411	-6.2	-3.2	5.3	12.0	.302	.851	.00648	-.00056	.00046		
1412	-6.2	-4.2	6.2	14.0	.303	.850	.00783	-.00074	.00058		
1413	-6.2	-5.2	7.1	16.0	.303	.851	.00898	-.00092	.00075		
1414	-6.2	-5.9	7.4	17.0	.303	.850	.00948	-.00102	.00087		
1415	-6.2	-2.3	4.5	10.0	.303	.851	.00511	-.00040	.00035		
1416	-6.2	-1.4	3.6	8.0	.302	.851	.00372	-.00022	.00027		
1417	-6.2	-.6	2.7	6.0	.302	.851	.00229	-.00004	.00020		
1418	-8.0	-1.3	3.4	8.0	.302	.850	.00306	-.00024	.00027		
1419	-8.0	-2.1	4.1	10.0	.303	.851	.00448	-.00046	.00036		
1420	-8.1	-3.0	5.0	12.0	.303	.851	.00586	-.00068	.00047		
1421	-8.1	-3.9	5.9	14.0	.302	.851	.00720	-.00090	.00060		
1422	-8.1	-4.9	6.8	16.0	.302	.851	.00845	-.00111	.00076		
1423	-8.1	-5.6	7.2	17.0	.302	.850	.00896	-.00122	.00086		
1424	-9.2	-2.4	5.4	12.0	.350	.883	.00472	-.00054	.00046		

Table 8. Concluded

(b) Concluded

RUN	52								
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1425	-9.2	-3.3	6.4	14.0	.351	.883	.00603	-.00078	.00060
1426	-9.2	-4.5	7.2	16.0	.350	.881	.00730	-.00102	.00076
1427	-9.2	-5.1	7.6	17.0	.350	.880	.00795	-.00113	.00085
1428	-9.1	-1.4	4.4	10.0	.350	.883	.00341	-.00029	.00034
1429	-9.1	-.5	3.4	8.0	.349	.881	.00203	-.00003	.00023
1430	-5.0	-.1	3.1	6.0	.353	.881	.00228	.00007	.00019
1431	-5.0	-1.0	4.2	8.0	.352	.881	.00360	-.00008	.00025
1432	-5.0	-1.8	5.3	10.0	.354	.882	.00496	-.00023	.00033
1433	-5.0	-2.8	6.3	12.0	.354	.882	.00628	-.00038	.00044
1434	-5.0	-4.0	7.1	14.0	.355	.883	.00752	-.00054	.00056
1435	-5.0	-5.3	8.0	16.0	.354	.880	.00861	-.00069	.00073

Table 9. Rotor Performance Data for Baseline Stiff Blade Set With
 $I_b = 0.7092 \text{ slug}\cdot\text{ft}^2$

(a) $\rho = 0.0076 \text{ slug}/\text{ft}^3$; $M_T = 0.628$; $\gamma = 9.35$

RUN	112								
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
3220	.0	-.9	.0	2.1	.150	.724	.00189	.00008	.00010
3221	.0	-1.5	.4	4.0	.152	.726	.00336	.00007	.00011
3222	.0	-2.1	.8	6.0	.151	.725	.00483	.00007	.00015
3223	.0	-2.9	1.1	8.0	.149	.724	.00622	.00006	.00020
3226	.0	-3.5	1.5	10.0	.150	.724	.00761	.00007	.00028
3227	.0	-4.2	2.0	12.0	.149	.724	.00892	.00004	.00037
3228	.0	-4.5	2.2	13.0	.149	.724	.00949	.00002	.00043
3229	-1.8	-4.3	2.2	13.0	.150	.724	.00912	-.00025	.00045
3230	-1.8	-4.0	2.0	12.0	.151	.725	.00850	-.00022	.00039
3231	-1.8	-3.3	1.6	10.0	.151	.725	.00723	-.00017	.00030
3232	-1.8	-2.7	1.1	8.0	.153	.726	.00589	-.00012	.00022
3233	-1.8	-2.0	.7	6.0	.151	.726	.00448	-.00007	.00016
3234	-1.8	-1.4	.4	4.0	.153	.726	.00306	-.00002	.00013
3235	.0	-.6	1.7	4.0	.302	.820	.00330	.00015	.00009
3236	.1	-1.4	2.6	6.0	.301	.820	.00469	.00012	.00011
3237	.1	-2.3	3.5	8.0	.302	.820	.00604	.00010	.00015
3238	.1	-3.2	4.4	10.0	.301	.819	.00732	.00006	.00021
3239	.1	-4.1	5.2	12.0	.301	.818	.00851	.00001	.00030
3240	.1	-4.6	5.7	13.0	.299	.818	.00902	-.00003	.00036
3241	-6.2	-3.3	4.5	12.0	.298	.819	.00637	-.00059	.00039
3242	-6.2	-4.3	5.3	14.0	.298	.818	.00760	-.00075	.00050
3243	-6.2	-4.7	5.7	15.0	.298	.817	.00817	-.00083	.00057
3244	-6.2	-5.3	6.1	16.0	.299	.818	.00870	-.00092	.00064
3245	-6.2	-2.3	3.7	10.0	.300	.819	.00510	-.00042	.00030
3246	-6.2	-1.5	2.8	8.0	.298	.818	.00380	-.00026	.00023
3247	-6.2	-.6	2.0	6.0	.299	.819	.00249	-.00010	.00017
3248	-5.0	-.3	2.4	6.0	.349	.850	.00247	.00001	.00016
3249	-5.0	-1.2	3.4	8.0	.350	.850	.00377	-.00013	.00021
3254	-5.0	-2.6	4.8	11.0	.349	.849	.00558	-.00032	.00032
3255	-5.0	-3.2	5.3	12.0	.350	.850	.00620	-.00039	.00037
3256	-5.0	-3.7	5.8	13.0	.349	.850	.00677	-.00046	.00042
3257	-5.0	-4.3	6.2	14.0	.350	.849	.00735	-.00053	.00048
3258	-9.2	-3.5	5.4	14.0	.347	.849	.00585	-.00078	.00051
3259	-9.2	-4.5	6.2	16.0	.346	.849	.00705	-.00101	.00065
3260	-9.2	-2.5	4.6	12.0	.345	.848	.00464	-.00056	.00039
3261	-9.2	-1.5	3.6	10.0	.345	.848	.00345	-.00033	.00029
3262	-9.2	-.6	2.7	8.0	.346	.849	.00217	-.00011	.00020

Table 9. Continued

(b) $\rho = 0.0076 \text{ slug/ft}^3$; $M_T = 0.65$; $\gamma = 9.35$

RUN	110									
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q	
3154	-1.8	-1.9	.7	6.0	.150	.748	.00428	-.00006	.00017	
3155	-1.8	-2.6	1.2	7.9	.150	.748	.00568	-.00012	.00022	
3156	-1.8	-3.2	1.6	9.9	.148	.746	.00708	-.00017	.00030	
3157	-1.8	-3.8	2.0	12.0	.150	.747	.00845	-.00022	.00039	
3158	-1.8	-4.2	2.3	13.0	.149	.746	.00911	-.00025	.00045	
3159	-1.8	-3.2	1.6	9.9	.151	.748	.00722	-.00016	.00030	
3160	-1.8	-2.5	1.1	8.0	.151	.748	.00585	-.00011	.00022	
3161	-1.8	-1.9	.8	6.0	.153	.749	.00447	-.00006	.00017	
3162	-5.0	-1.6	.8	6.0	.150	.747	.00376	-.00024	.00019	
3163	-5.0	-2.3	1.1	8.0	.149	.747	.00513	-.00036	.00025	
3164	-5.0	-2.9	1.5	10.0	.147	.746	.00651	-.00048	.00033	
3165	-5.0	-3.6	1.9	12.0	.149	.746	.00783	-.00061	.00043	
3166	-5.0	-3.9	2.2	13.0	.151	.747	.00847	-.00069	.00049	
3167	-5.0	-4.3	2.3	14.0	.149	.746	.00910	-.00074	.00055	
3168	-5.0	-3.5	1.9	12.0	.148	.746	.00787	-.00061	.00043	
3169	-5.0	-2.9	1.5	10.0	.150	.747	.00654	-.00048	.00034	
3170	-5.0	-2.3	1.1	8.0	.150	.747	.00513	-.00036	.00025	
3171	.0	-2.1	.7	6.0	.150	.746	.00484	.00009	.00016	
3172	.0	-2.8	1.1	8.0	.150	.746	.00621	.00007	.00021	
3173	.0	-3.4	1.5	10.0	.150	.746	.00762	.00006	.00029	
3174	.0	-4.1	1.9	12.0	.149	.748	.00887	.00005	.00039	
3175	.0	-4.4	2.1	13.0	.149	.748	.00949	.00004	.00044	
3176	.0	-4.1	1.9	12.0	.148	.747	.00887	.00004	.00038	
3177	.0	-3.5	1.4	10.0	.150	.748	.00759	.00006	.00029	
3178	.0	-2.8	1.1	8.0	.150	.748	.00624	.00007	.00021	
3179	.0	-2.1	.7	6.0	.151	.749	.00482	.00007	.00015	
RUN	111									
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q	
3183	-6.2	-1.8	3.2	8.9	.299	.846	.00436	-.00032	.00026	
3184	-6.2	-2.7	4.0	10.9	.299	.846	.00567	-.00048	.00035	
3185	-6.2	-3.6	4.9	12.9	.298	.845	.00697	-.00065	.00045	
3186	-6.2	-4.6	5.7	14.9	.298	.845	.00811	-.00081	.00057	
3187	-6.2	-5.1	6.1	15.9	.298	.845	.00868	-.00090	.00066	
3188	-8.0	-4.8	5.9	15.9	.297	.845	.00815	-.00106	.00067	
3189	-8.0	-4.8	5.9	15.9	.298	.843	.00817	-.00106	.00067	
3190	-8.0	-5.4	6.2	16.9	.298	.841	.00867	-.00114	.00075	
3191	-8.0	-3.7	5.0	13.9	.298	.845	.00699	-.00083	.00054	
3192	-8.0	-2.8	4.2	11.9	.297	.844	.00573	-.00063	.00042	
3193	-8.0	-2.0	3.4	9.9	.298	.845	.00446	-.00043	.00033	
3194	.0	-3.1	4.3	10.0	.301	.845	.00730	.00011	.00023	
3195	.0	-4.0	5.3	11.9	.300	.843	.00849	.00005	.00032	
3196	.0	-4.4	5.7	12.9	.300	.843	.00903	.00001	.00039	

Table 9. Concluded

(b) Concluded

RUN	111								
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
3197	.0	-5.0	6.2	13.9	.300	.843	.00947	-.00006	.00046
3198	.0	-3.1	4.3	9.9	.301	.844	.00731	.00008	.00023
3199	.0	-2.1	3.4	7.9	.301	.844	.00600	.00011	.00016
3200	-5.0	-1.9	4.4	9.9	.351	.876	.00497	-.00024	.00029
3201	-5.0	-2.9	5.3	11.9	.350	.876	.00618	-.00038	.00038
3202	-5.0	-4.0	6.3	13.9	.349	.875	.00734	-.00052	.00049
3203	-5.0	-5.1	7.2	15.9	.350	.875	.00832	-.00066	.00064
3204	-5.0	-5.7	7.6	16.9	.351	.871	.00874	-.00073	.00075
3205	-5.0	-2.9	5.2	11.9	.349	.875	.00618	-.00036	.00038
3206	-5.0	-4.0	6.2	13.9	.350	.875	.00732	-.00051	.00049
3207	-5.0	-2.0	4.3	9.9	.350	.875	.00499	-.00024	.00029
3208	-9.2	-1.4	3.5	9.9	.346	.874	.00341	-.00032	.00030
3209	-9.2	-2.3	4.5	11.9	.346	.874	.00459	-.00054	.00040
3210	-9.2	-3.3	5.4	13.9	.347	.874	.00582	-.00077	.00052
3211	-9.2	-4.3	6.3	15.9	.346	.874	.00702	-.00100	.00066
3212	-9.2	-4.8	6.7	16.9	.348	.873	.00756	-.00110	.00074
3213	-9.2	-3.3	5.4	13.9	.346	.874	.00586	-.00078	.00052
3214	-9.2	-2.3	4.5	11.9	.347	.874	.00460	-.00054	.00040

Table 10. Rotor Performance Data for Baseline Elastic Blade Set
With $I_b = 0.5602$ slug-ft 2

(a) $\rho = 0.006$ slug/ft 3 ; $M_T = 0.628$; $\gamma = 9.3$

RUN	69	HOVER							
POINT	A ₁	B ₁	θ	C _T	C _Q				
2013	.0	.0	2.0	.00083	.00011				
2014	.1	.0	6.0	.00275	.00021				
2015	.1	.1	8.0	.00393	.00028				
2016	.1	.1	9.9	.00521	.00038				
2018	.1	.0	12.0	.00655	.00051				
2019	.1	.0	12.5	.00692	.00055				
2020	.1	.0	12.8	.00711	.00057				
2021	.0	.0	14.1	.00799	.00068				
2022	.1	.0	15.3	.00881	.00078				
2023	.1	.0	15.3	.00887	.00081				
2024	.1	.0	16.4	.00960	.00091				
2025	.2	.1	17.5	.01036	.00105				
2026	.1	.0	18.2	.01071	.00114				
2027	.1	.1	15.0	.00865	.00078				
2028	.2	.1	12.0	.00662	.00053				
2029	.1	.1	9.9	.00529	.00040				
2030	.1	.1	8.0	.00401	.00030				
2031	.1	.1	6.0	.00281	.00021				
RUN	61								
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1745	.0	-2.4	1.7	6.0	.150	.724	.00499	.00005	.00016
1746	.0	-3.2	2.1	8.0	.149	.724	.00644	.00003	.00022
1747	.0	-3.9	2.4	10.0	.150	.725	.00787	.00003	.00031
1748	.0	-4.6	2.8	12.0	.152	.725	.00918	.00001	.00042
1749	.0	-5.4	3.3	14.0	.149	.724	.01034	-.00003	.00057
1750	.1	-5.7	3.7	15.0	.149	.724	.01082	-.00006	.00066
1751	.1	-6.2	4.0	16.0	.151	.725	.01123	-.00009	.00075
1752	-1.8	-4.4	2.8	12.0	.149	.724	.00879	-.00025	.00044
1753	-1.8	-5.2	3.3	14.0	.151	.725	.00997	-.00034	.00059
1754	-1.8	-6.1	3.9	16.0	.151	.725	.01088	-.00043	.00077
1755	-1.8	-3.7	2.4	10.0	.150	.725	.00746	-.00020	.00033
1756	-1.8	-3.1	2.1	8.0	.151	.725	.00611	-.00015	.00025
1757	-1.8	-2.4	1.6	6.0	.151	.725	.00469	-.00010	.00018
1758	-1.8	-1.8	1.3	4.0	.152	.726	.00319	-.00005	.00013
1759	.1	-1.2	2.9	4.0	.303	.821	.00329	.00010	.00008
1760	.1	-2.0	3.7	6.0	.304	.821	.00475	.00007	.00012
1761	.1	-2.8	4.7	7.9	.305	.821	.00611	.00003	.00017
1762	.1	-3.7	5.6	10.0	.305	.821	.00743	-.00001	.00025
1763	.0	-4.5	6.5	12.0	.305	.821	.00859	-.00008	.00035
1764	.0	-5.6	7.5	14.0	.306	.821	.00946	-.00018	.00052

Table 10. Continued

(a) Continued

RUN	61	POINT	α_s	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1765	-6.2	-2.0	3.9	8.0	.304	.821	.00380	-.00032	.00023		
1766	-6.2	-2.9	4.8	10.0	.303	.820	.00514	-.00050	.00032		
1769	-6.2	-3.8	5.8	12.0	.303	.820	.00643	-.00068	.00043		
1770	-6.2	-4.7	6.6	14.0	.304	.820	.00768	-.00085	.00055		
1771	-6.2	-5.2	7.0	15.0	.304	.820	.00823	-.00094	.00064		
1772	-6.2	-5.7	7.5	16.0	.304	.819	.00871	-.00102	.00073		
1773	-5.0	-3.5	6.8	12.0	.355	.854	.00620	-.00050	.00041		
1774	-5.0	-4.5	7.8	14.0	.356	.852	.00733	-.00064	.00054		
1775	-5.0	-5.5	8.8	16.0	.354	.854	.00825	-.00079	.00072		
1776	-5.0	-2.6	5.7	9.9	.354	.853	.00502	-.00035	.00031		
1777	-5.0	-1.7	4.7	7.9	.353	.853	.00368	-.00020	.00022		
1778	-9.2	-2.0	4.9	9.9	.350	.853	.00336	-.00040	.00031		
1779	-9.2	-2.9	5.9	12.0	.351	.853	.00469	-.00063	.00043		
1780	-9.2	-3.8	6.8	14.0	.352	.854	.00594	-.00088	.00057		
1781	-9.2	-4.8	7.7	16.0	.351	.853	.00711	-.00111	.00073		
1782	-9.2	-5.4	8.2	17.0	.351	.853	.00763	-.00123	.00083		
RUN	62	POINT	α_s	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
1786	-1.4	-3.4	2.3	9.1	.154	.727	.00696	-.00015	.00029		
1787	-1.4	-3.4	2.3	9.1	.154	.727	.00696	-.00015	.00029		
1788	-1.3	-3.5	2.3	9.4	.151	.725	.00715	-.00014	.00030		
1789	-1.3	-3.5	2.3	9.4	.153	.727	.00715	-.00015	.00030		
1790	-1.2	-3.9	2.5	10.5	.152	.726	.00792	-.00015	.00035		
1791	-1.2	-3.9	2.6	10.6	.153	.727	.00800	-.00016	.00036		
1792	-1.2	-3.9	2.6	10.6	.154	.727	.00800	-.00016	.00036		
1793	-1.0	-4.4	2.8	11.8	.152	.725	.00885	-.00016	.00043		
1794	-1.0	-4.4	2.8	11.8	.151	.724	.00885	-.00016	.00043		
1795	-1.0	-4.5	2.8	12.0	.152	.726	.00897	-.00016	.00044		
1796	-1.0	-4.5	2.8	12.0	.151	.725	.00895	-.00016	.00044		
1797	-.8	-4.9	3.1	13.1	.151	.724	.00972	-.00016	.00052		
1798	-.8	-4.9	3.1	13.1	.150	.724	.00972	-.00015	.00052		
1799	-.6	-5.5	3.6	14.6	.154	.726	.01052	-.00017	.00063		
1800	-.5	-5.5	3.6	14.6	.152	.725	.01054	-.00016	.00063		
1801	.0	-6.5	4.3	16.6	.153	.727	.01137	-.00015	.00084		
1802	-2.6	-3.4	3.4	9.6	.204	.759	.00694	-.00028	.00031		
1803	-2.6	-3.4	3.4	9.6	.205	.759	.00695	-.00027	.00031		
1804	-2.6	-3.4	3.4	9.6	.204	.758	.00697	-.00027	.00031		
1805	-2.8	-3.5	3.5	9.8	.203	.758	.00720	-.00028	.00032		
1806	-2.5	-3.5	3.5	9.9	.204	.758	.00721	-.00027	.00032		
1807	-2.1	-4.0	3.7	10.9	.203	.758	.00805	-.00027	.00036		
1810	-2.1	-4.0	3.7	10.9	.203	.757	.00803	-.00027	.00036		

Table 10. Continued

(a) Continued

RUN	63								
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1814	-2.6	-3.5	3.4	9.6	.202	.758	.00694	-.00029	.00030
1815	-2.5	-3.6	3.5	9.9	.203	.758	.00719	-.00029	.00031
1816	-2.1	-4.1	3.8	10.9	.203	.757	.00803	-.00029	.00035
1817	-1.7	-4.4	4.2	12.1	.203	.757	.00886	-.00027	.00041
1820	-1.7	-4.5	4.2	12.3	.203	.757	.00901	-.00027	.00042
1821	-1.7	-4.5	4.2	12.3	.202	.757	.00901	-.00027	.00042
1822	-1.4	-5.1	4.6	13.3	.203	.758	.00966	-.00028	.00049
1823	-1.4	-5.0	4.6	13.3	.203	.757	.00966	-.00028	.00049
1824	-.9	-5.8	5.3	14.8	.202	.757	.01049	-.00029	.00062
1825	-.9	-5.8	5.3	14.8	.203	.758	.01047	-.00029	.00062
1826	-.6	-6.3	5.8	15.8	.203	.757	.01087	-.00030	.00072
1827	-.6	-6.3	5.8	15.8	.203	.756	.01087	-.00030	.00072
RUN	64								
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1831	-3.7	-3.5	4.5	10.5	.254	.790	.00694	-.00041	.00033
1832	-3.7	-3.5	4.5	10.5	.255	.791	.00692	-.00041	.00033
1833	-3.7	-3.6	4.6	10.7	.253	.790	.00710	-.00042	.00034
1834	-3.7	-3.6	4.5	10.7	.253	.790	.00713	-.00041	.00034
1835	-3.7	-3.6	4.5	10.7	.253	.790	.00715	-.00041	.00034
1836	-3.2	-4.2	5.1	11.8	.253	.790	.00800	-.00042	.00040
1837	-3.2	-4.2	5.0	11.8	.254	.790	.00800	-.00042	.00040
1838	-2.8	-1.5	6.2	12.2	.253	.790	.00867	-.00021	.00040
1839	-2.8	-1.5	6.3	12.2	.253	.790	.00867	-.00021	.00040
1840	-2.6	-4.7	5.6	12.9	.254	.789	.00882	-.00040	.00046
1841	-2.6	-4.7	5.6	12.9	.252	.789	.00881	-.00040	.00046
1842	-2.6	-4.8	5.7	13.2	.253	.790	.00897	-.00042	.00048
1843	-2.5	-4.8	5.7	13.2	.252	.789	.00897	-.00041	.00048
1844	-2.0	-5.5	6.3	14.3	.253	.790	.00963	-.00042	.00058
1847	-1.2	-6.4	7.2	15.7	.254	.789	.01013	-.00042	.00073
1848	-1.2	-6.3	7.2	15.7	.254	.789	.01011	-.00041	.00073
1849	-4.8	-3.9	5.6	11.9	.284	.809	.00715	-.00053	.00042
1850	-4.8	-3.9	5.6	9.9	.283	.808	.00537	-.00047	.00033
1851	-4.8	-3.8	5.6	10.9	.283	.808	.00632	-.00052	.00038
1852	-4.8	-3.9	5.5	11.9	.283	.808	.00716	-.00054	.00042
1853	-4.8	-3.9	5.5	12.9	.282	.809	.00799	-.00055	.00047
1854	-4.8	-3.8	5.6	13.9	.285	.809	.00873	-.00052	.00053
1855	-4.8	-5.8	5.6	11.9	.285	.809	.00664	-.00068	.00044
1856	-4.8	-4.9	5.6	11.9	.283	.808	.00690	-.00061	.00042
1857	-4.8	-3.9	5.6	11.9	.283	.809	.00714	-.00054	.00041
1858	-4.8	-2.9	5.6	11.8	.283	.808	.00737	-.00047	.00040
1859	-4.8	-1.9	5.6	11.9	.283	.808	.00763	-.00040	.00040
1860	-4.8	-3.8	3.6	11.9	.283	.808	.00771	-.00041	.00039
1861	-4.8	-3.9	4.6	11.9	.283	.808	.00742	-.00048	.00040
1862	-4.8	-3.8	5.6	11.9	.284	.809	.00712	-.00056	.00041
1863	-4.8	-3.9	6.6	11.9	.283	.808	.00687	-.00062	.00042
1864	-4.8	-3.9	7.6	11.8	.283	.809	.00654	-.00068	.00043
1865	-4.8	-3.9	7.6	11.8	.283	.809	.00653	-.00068	.00043

Table 10. Continued

(a) Continued

RUN	65	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1870	-4.9	-3.9	5.5	12.0	.282	.807	.00730	-.00056	.00043		
1871	-4.4	-4.0	5.5	12.8	.283	.806	.00814	-.00051	.00047		
1872	-4.4	-4.0	5.5	12.8	.283	.806	.00812	-.00050	.00047		
1873	-4.4	-3.9	5.6	10.8	.282	.808	.00641	-.00049	.00037		
1874	-4.4	-3.9	5.6	11.8	.283	.808	.00730	-.00050	.00042		
1875	-4.4	-3.9	5.5	12.8	.282	.808	.00813	-.00049	.00047		
1876	-4.4	-3.9	5.6	13.8	.282	.807	.00891	-.00048	.00054		
1877	-4.4	-3.9	5.5	14.8	.282	.807	.00953	-.00044	.00063		
1878	-4.5	-6.0	5.6	12.8	.284	.807	.00767	-.00068	.00050		
1879	-4.4	-5.0	5.6	12.8	.282	.807	.00789	-.00059	.00049		
1883	-4.4	-2.0	5.6	12.9	.283	.808	.00859	-.00031	.00047		
1884	-4.4	-4.0	7.5	12.8	.284	.807	.00757	-.00064	.00050		
1885	-4.4	-4.0	6.6	12.8	.284	.808	.00783	-.00057	.00049		
1886	-4.4	-4.0	5.6	12.8	.283	.808	.00810	-.00050	.00048		
1887	-4.4	-4.0	4.6	12.8	.283	.808	.00838	-.00042	.00047		
1888	-4.4	-4.0	3.6	12.8	.283	.808	.00865	-.00034	.00046		
1889	-8.1	-1.6	3.1	13.3	.282	.807	.00838	-.00054	.00051		
1890	-8.1	-1.6	3.1	13.3	.281	.807	.00838	-.00054	.00051		
1891	-3.9	-4.8	6.2	14.1	.284	.807	.00897	-.00053	.00057		
1892	-3.9	-4.8	6.2	14.1	.284	.807	.00897	-.00053	.00057		
1893	-3.9	-4.7	6.2	12.1	.284	.807	.00737	-.00055	.00045		
1894	-3.9	-4.7	6.2	13.1	.285	.808	.00818	-.00056	.00050		
1895	-3.9	-4.7	6.2	14.1	.282	.807	.00898	-.00054	.00057		
1896	-3.9	-4.7	6.2	15.1	.283	.807	.00954	-.00052	.00067		
1897	-3.9	-4.7	6.2	16.1	.283	.806	.00999	-.00046	.00077		
1899	-3.9	-5.7	6.2	14.1	.284	.807	.00869	-.00065	.00057		
1900	-3.9	-4.8	6.2	14.1	.283	.806	.00892	-.00055	.00057		
1901	-3.9	-3.8	6.2	14.1	.283	.806	.00914	-.00044	.00056		
1902	-3.9	-2.8	6.2	14.1	.284	.807	.00934	-.00034	.00056		
1903	-3.9	-4.8	8.2	14.0	.284	.806	.00839	-.00072	.00058		
1904	-3.9	-4.8	7.2	14.0	.283	.806	.00861	-.00064	.00057		
1905	-3.9	-4.8	6.2	14.1	.284	.807	.00891	-.00055	.00056		
1906	-3.9	-4.8	5.2	14.2	.284	.807	.00916	-.00047	.00056		
1907	-3.9	-4.8	4.2	14.2	.284	.806	.00942	-.00038	.00055		
1908	-2.0	-6.4	7.7	16.0	.283	.806	.00988	-.00054	.00077		
1911	-5.3	-4.1	6.1	12.6	.303	.820	.00717	-.00064	.00047		
1912	-5.2	-4.2	6.2	12.8	.302	.820	.00733	-.00064	.00048		
1913	-5.2	-4.3	6.2	12.8	.304	.821	.00735	-.00064	.00048		
1914	-4.4	-4.9	6.7	13.8	.303	.820	.00812	-.00066	.00054		
1915	-4.4	-4.9	6.7	13.8	.303	.820	.00811	-.00066	.00054		
1916	-9.8	-1.6	3.2	14.2	.300	.818	.00820	-.00076	.00057		
1919	-9.8	-1.6	3.2	14.2	.299	.819	.00819	-.00076	.00057		

Table 10. Continued

(a) Continued

RUN	66	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1923	-5.1	-4.0	6.0	12.4	.304	.822	.00704	.00060	.00044		
1924	-5.1	-4.0	6.0	12.4	.304	.822	.00704	-.00059	.00044		
1925	-5.0	-4.1	6.1	12.6	.305	.822	.00726	-.00060	.00045		
1926	-4.9	-4.1	6.1	12.6	.304	.821	.00726	-.00060	.00045		
1927	-5.0	-4.1	6.1	12.6	.305	.822	.00727	-.00060	.00045		
1928	-4.2	-4.8	6.7	13.8	.304	.820	.00817	-.00061	.00052		
1929	-4.2	-4.8	6.7	13.8	.305	.820	.00816	-.00061	.00052		
1930	-9.8	-1.6	3.2	14.3	.302	.820	.00821	-.00076	.00057		
1931	-9.8	-1.6	3.2	14.3	.302	.820	.00821	-.00076	.00057		
1932	-3.3	-5.6	7.3	14.8	.305	.819	.00896	-.00061	.00062		
1933	-3.3	-5.6	7.3	14.8	.306	.820	.00896	-.00062	.00062		
1934	-3.1	-5.8	7.5	15.1	.305	.819	.00911	-.00062	.00065		
1935	-3.1	-5.8	7.5	15.1	.305	.819	.00911	-.00062	.00065		
1936	-1.8	-7.1	8.7	17.0	.305	.819	.00983	-.00060	.00089		
1937	-1.8	-7.1	8.7	17.0	.305	.817	.00982	-.00060	.00088		
1938	-7.4	-4.6	7.4	14.7	.353	.852	.00695	-.00083	.00063		
1939	-7.4	-4.6	7.4	14.7	.353	.851	.00698	-.00084	.00063		
1940	-7.4	-4.6	7.5	12.7	.353	.852	.00514	-.00069	.00049		
1941	-7.4	-4.6	7.5	13.7	.353	.852	.00608	-.00077	.00056		
1942	-7.4	-4.6	7.5	14.7	.354	.853	.00697	-.00083	.00063		
1943	-7.4	-4.6	7.5	15.7	.354	.853	.00775	-.00086	.00071		
1944	-7.3	-4.6	7.4	16.7	.353	.852	.00839	-.00086	.00080		
1945	-7.4	-6.6	7.5	14.7	.353	.852	.00636	-.00094	.00064		
1946	-7.4	-6.6	7.5	14.7	.353	.852	.00637	-.00094	.00064		
1947	-7.4	-6.6	7.5	14.7	.353	.852	.00637	-.00094	.00064		
1948	-7.4	-5.6	7.4	14.7	.352	.851	.00669	-.00089	.00063		
1949	-7.4	-5.6	7.4	14.7	.353	.852	.00670	-.00089	.00063		
1950	-7.4	-4.6	7.4	14.7	.353	.852	.00698	-.00084	.00063		
1951	-7.3	-3.6	7.4	14.7	.352	.851	.00727	-.00077	.00062		
1952	-7.3	-2.6	7.4	14.8	.352	.850	.00755	-.00070	.00062		
1953	-7.4	-4.6	9.5	14.7	.352	.850	.00636	-.00092	.00063		
1956	-7.4	-4.6	8.5	14.7	.353	.851	.00667	-.00089	.00063		
1957	-7.4	-4.6	7.4	14.7	.353	.851	.00697	-.00084	.00063		
1958	-7.4	-4.6	6.4	14.8	.353	.851	.00729	-.00080	.00062		
1961	-7.3	-4.6	5.5	14.8	.353	.851	.00760	-.00075	.00062		

Table 10. Continued

(a) Concluded

RUN 67

POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1965	-6.6	-4.6	7.6	14.6	.354	.853	.00721	-.00080	.00060
1966	-6.6	-4.6	7.6	14.6	.353	.852	.00719	-.00080	.00060
1967	-6.6	-4.6	7.6	12.6	.352	.852	.00542	-.00069	.00046
1968	-6.6	-4.7	7.6	13.6	.354	.853	.00632	-.00076	.00053
1969	-6.6	-4.6	7.6	14.6	.354	.853	.00718	-.00080	.00059
1970	-6.6	-4.7	7.5	15.6	.353	.853	.00794	-.00081	.00067
1971	-6.6	-4.7	7.5	16.6	.354	.852	.00853	-.00081	.00077
1972	-6.6	-6.6	7.6	14.6	.353	.852	.00661	-.00093	.00060
1973	-6.6	-5.6	7.6	14.6	.353	.852	.00693	-.00087	.00060
1974	-6.6	-4.6	7.6	14.6	.353	.852	.00719	-.00080	.00059
1975	-6.6	-3.7	7.6	14.6	.353	.852	.00746	-.00073	.00059
1976	-6.6	-2.7	7.6	14.6	.354	.852	.00769	-.00066	.00058
1977	-6.6	-4.7	9.6	14.6	.353	.852	.00657	-.00091	.00060
1978	-6.6	-4.7	8.6	14.6	.354	.852	.00687	-.00086	.00060
1979	-6.6	-4.6	7.6	14.6	.353	.852	.00717	-.00081	.00059
1980	-6.6	-4.7	6.6	14.6	.353	.852	.00745	-.00076	.00058
1981	-6.6	-4.7	6.6	14.6	.353	.852	.00748	-.00076	.00058
1982	-6.6	-4.6	5.6	14.6	.355	.854	.00779	-.00069	.00058
1983	-5.7	-5.5	8.5	16.0	.353	.853	.00805	-.00086	.00071
1984	-5.7	-5.5	8.5	16.0	.352	.853	.00805	-.00087	.00071
1985	-4.2	-6.7	9.7	17.8	.354	.850	.00890	-.00085	.00094

RUN 68

POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1989	-7.8	-4.8	8.3	15.8	.373	.869	.00702	-.00090	.00068
1990	-7.8	-4.8	8.3	13.8	.374	.870	.00525	-.00075	.00053
1991	-7.8	-4.8	8.3	14.8	.374	.869	.00614	-.00083	.00061
1992	-7.8	-4.9	8.3	15.8	.374	.869	.00701	-.00088	.00068
1993	-7.8	-4.9	8.3	16.8	.375	.870	.00783	-.00091	.00078
1994	-7.8	-4.9	8.3	17.8	.375	.870	.00835	-.00092	.00089
1995	-7.8	-6.8	8.4	15.8	.374	.869	.00640	-.00098	.00069
1996	-7.8	-5.8	8.4	15.8	.374	.869	.00673	-.00093	.00069
1997	-7.8	-4.8	8.4	15.8	.373	.869	.00705	-.00087	.00069
1998	-7.8	-3.8	8.4	15.7	.373	.869	.00729	-.00079	.00068
1999	-7.8	-2.8	8.4	15.7	.374	.870	.00754	-.00072	.00068
2000	-7.8	-4.8	6.4	15.8	.374	.870	.00763	-.00075	.00068
2001	-7.8	-4.8	7.4	15.7	.374	.870	.00732	-.00081	.00068
2002	-7.8	-4.8	8.4	15.8	.374	.870	.00699	-.00087	.00068
2003	-7.8	-4.8	9.4	15.7	.373	.870	.00667	-.00091	.00068
2004	-7.8	-4.8	10.4	15.7	.374	.871	.00635	-.00095	.00069
2005	-7.2	-5.8	9.1	17.2	.374	.870	.00792	-.00097	.00082
2006	-7.2	-5.7	9.1	17.2	.374	.870	.00790	-.00097	.00082
2007	-6.1	-6.5	9.8	18.2	.384	.856	.00841	-.00095	.00094
2008	-10.4	-5.3	9.1	18.0	.399	.887	.00686	-.00112	.00088
2009	-10.4	-4.9	8.7	17.1	.403	.880	.00654	-.00107	.00082

Table 10. Continued

(b) $\rho = 0.006 \text{ slug/ft}^3$; $M_T = 0.65$; $\gamma = 9.3$

RUN	58	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1616	-1.7	1616	-3.0	2.5	8.3	.149	.748	.00650	-.00016	.00028	
1617	-1.7	1617	-2.8	2.7	8.3	.148	.748	.00650	-.00016	.00028	
1618	-2.5	1618	-2.9	3.6	8.6	.203	.783	.00651	-.00025	.00028	
1619	-2.5	1619	-2.9	3.6	8.6	.204	.784	.00651	-.00024	.00028	
1620	-4.2	1620	-2.9	4.6	9.7	.250	.814	.00648	-.00041	.00034	
1621	-4.2	1621	-2.9	4.6	9.7	.251	.815	.00648	-.00041	.00034	
1622	-5.0	1622	-3.0	5.5	10.7	.280	.833	.00659	-.00051	.00039	
1623	-5.0	1623	-2.9	5.5	10.7	.282	.833	.00661	-.00051	.00039	
1624	-5.0	1624	-3.0	5.5	8.7	.282	.835	.00470	-.00042	.00031	
1625	-5.0	1625	-2.8	5.6	9.7	.282	.834	.00563	-.00048	.00035	
1626	-5.0	1626	-2.9	5.5	10.7	.283	.833	.00655	-.00051	.00039	
1627	-5.0	1627	-2.8	5.5	11.7	.282	.834	.00744	-.00053	.00043	
1628	-5.0	1628	-2.9	5.5	12.7	.282	.834	.00831	-.00053	.00049	
1629	-5.0	1629	-5.0	5.5	10.7	.281	.834	.00618	-.00063	.00041	
1630	-5.0	1630	-4.0	5.4	10.8	.281	.835	.00642	-.00058	.00040	
1631	-5.0	1631	-3.0	5.5	10.8	.281	.835	.00662	-.00052	.00039	
1632	-5.0	1632	-2.0	5.5	10.8	.281	.835	.00687	-.00046	.00038	
1633	-5.0	1633	-1.0	5.5	10.8	.280	.834	.00715	-.00040	.00038	
1635	-5.0	1635	-2.9	7.5	10.7	.281	.835	.00602	-.00063	.00041	
1636	-5.0	1636	-3.0	6.5	10.8	.280	.834	.00636	-.00059	.00040	
1637	-5.0	1637	-3.0	5.5	10.8	.281	.835	.00667	-.00053	.00039	
1638	-5.0	1638	-3.0	4.5	10.8	.281	.834	.00703	-.00047	.00038	
1639	-5.0	1639	-3.0	3.5	10.8	.281	.834	.00734	-.00039	.00037	
1640	-5.9	1640	-2.7	6.2	11.4	.300	.847	.00647	-.00062	.00043	
1641	-5.9	1641	-2.7	6.2	11.4	.301	.846	.00649	-.00062	.00043	
1642	-8.0	1642	-3.0	7.7	13.8	.351	.880	.00652	-.00082	.00060	
1643	-7.9	1643	-3.0	7.7	13.8	.352	.881	.00650	-.00082	.00060	
1644	-5.9	1644	-2.9	6.1	11.4	.302	.846	.00645	-.00061	.00043	
1645	-5.1	1645	-2.9	5.5	10.7	.282	.833	.00657	-.00053	.00038	
1646	-4.2	1646	-2.9	4.6	9.7	.252	.814	.00648	-.00044	.00033	
1647	-2.5	1647	-2.8	3.6	8.6	.203	.781	.00651	-.00026	.00028	
1648	-1.7	1648	-2.8	2.6	8.4	.151	.747	.00660	-.00015	.00028	

Table 10. Continued

(b) Continued

RUN	59	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1653	-7.9	-3.1	7.7	11.7	.350	.881	.00455	.00062	.00044		
1654	-7.9	-3.0	7.7	12.8	.350	.880	.00551	.00072	.00051		
1655	-7.9	-3.0	7.7	13.8	.351	.881	.00645	.00080	.00059		
1656	-7.9	-3.0	7.7	14.7	.351	.879	.00732	.00085	.00066		
1657	-7.9	-3.1	7.7	15.7	.350	.881	.00804	.00087	.00076		
1658	-8.0	-5.1	7.6	13.7	.351	.880	.00597	.00089	.00059		
1659	-7.9	-4.1	7.6	13.7	.350	.881	.00623	.00084	.00059		
1660	-7.9	-3.2	7.6	13.8	.350	.881	.00648	.00080	.00059		
1661	-7.9	-2.1	7.6	13.8	.351	.880	.00676	.00074	.00059		
1662	-7.9	-1.2	7.6	13.8	.351	.880	.00700	.00068	.00058		
1663	-8.0	-3.2	9.6	13.7	.350	.880	.00579	.00084	.00059		
1664	-7.9	-3.2	8.6	13.7	.351	.879	.00613	.00081	.00059		
1665	-7.9	-3.1	7.6	13.8	.351	.879	.00649	.00077	.00059		
1667	-7.9	-3.1	6.6	13.8	.351	.879	.00685	.00072	.00059		
1668	-7.9	-3.1	5.6	13.8	.351	.879	.00719	.00067	.00058		
1669	-9.5	-3.5	8.2	15.3	.374	.893	.00650	.00090	.00071		
1670	-9.4	-3.5	8.2	15.3	.374	.893	.00648	.00090	.00071		
1671	-9.4	-3.4	8.2	13.3	.374	.894	.00469	.00070	.00053		
1672	-9.4	-3.5	8.2	14.4	.374	.892	.00560	.00082	.00062		
1673	-9.5	-3.4	8.2	15.3	.375	.893	.00650	.00091	.00071		
1674	-9.4	-3.5	8.1	16.3	.375	.892	.00737	.00098	.00080		
1675	-9.5	-5.5	8.2	15.3	.374	.893	.00591	.00098	.00070		
1676	-9.5	-4.5	8.2	15.3	.375	.891	.00619	.00095	.00070		
1677	-9.4	-3.5	8.2	15.3	.377	.888	.00644	.00089	.00070		
1678	-9.4	-2.5	8.2	15.3	.376	.891	.00673	.00084	.00071		
1679	-9.4	-1.5	8.2	15.3	.374	.891	.00702	.00079	.00072		
1680	-9.5	-3.5	10.2	15.3	.373	.892	.00576	.00095	.00071		
1681	-9.5	-3.5	9.2	15.3	.375	.892	.00610	.00093	.00071		
1682	-9.5	-3.5	8.1	15.3	.374	.891	.00647	.00091	.00071		
1683	-9.4	-3.5	7.2	15.3	.374	.892	.00679	.00087	.00071		
1684	-9.4	-3.5	6.2	15.3	.375	.892	.00716	.00083	.00071		

Table 10. Concluded

(b) Concluded

RUN	60	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1692	.0	-1.8	1.2	4.0	.152	.751	.00308	.00005	.00012		
1693	.0	-2.4	1.8	6.0	.150	.749	.00459	.00005	.00015		
1694	.0	-3.0	2.2	8.0	.151	.750	.00613	.00004	.00022		
1695	.0	-3.7	2.6	10.0	.150	.747	.00761	.00003	.00030		
1696	.0	-4.4	3.0	12.0	.148	.747	.00901	.00002	.00042		
1697	-.1	-5.3	3.4	14.0	.148	.746	.01032	-.00002	.00058		
1698	-1.8	-4.3	2.8	12.0	.149	.748	.00875	-.00023	.00045		
1699	-1.8	-5.1	3.4	14.0	.149	.747	.00995	-.00032	.00060		
1700	-1.8	-3.7	2.5	10.0	.149	.747	.00744	-.00019	.00034		
1701	-1.8	-3.1	2.0	8.0	.149	.747	.00601	-.00014	.00025		
1702	-1.8	-2.4	1.6	6.0	.151	.748	.00454	-.00008	.00018		
1703	-1.8	-1.8	1.2	4.0	.153	.750	.00305	-.00003	.00014		
1704	-5.0	-1.5	1.2	4.0	.153	.750	.00236	-.00013	.00015		
1705	-5.0	-2.1	1.6	6.0	.152	.749	.00386	-.00026	.00020		
1706	-5.0	-2.7	2.0	8.0	.150	.748	.00531	-.00038	.00028		
1707	-5.0	-3.3	2.4	10.0	.148	.746	.00671	-.00051	.00037		
1708	-5.0	-4.0	2.6	12.0	.149	.747	.00814	-.00063	.00048		
1709	-5.0	-4.8	3.1	14.0	.149	.746	.00939	-.00077	.00063		
1710	.0	-.9	2.7	4.0	.303	.848	.00313	.00015	.00010		
1711	.1	-1.6	3.7	6.0	.304	.849	.00459	.00011	.00014		
1712	.1	-2.4	4.8	8.0	.304	.849	.00600	.00007	.00019		
1713	.1	-3.2	5.7	10.0	.303	.848	.00733	.00003	.00026		
1714	.1	-4.0	6.7	12.0	.303	.848	.00850	-.00004	.00037		
1715	.1	-5.0	7.8	14.0	.304	.848	.00932	-.00014	.00055		
1716	-6.2	-1.6	4.0	8.0	.302	.848	.00365	-.00027	.00024		
1717	-6.2	-2.5	4.9	9.9	.302	.848	.00504	-.00046	.00033		
1718	-6.2	-3.3	5.8	12.0	.303	.848	.00640	-.00064	.00044		
1719	-6.2	-4.1	6.8	14.0	.302	.847	.00767	-.00082	.00057		
1720	-6.2	-4.8	7.2	15.0	.302	.847	.00826	-.00091	.00066		
1721	-6.2	-5.5	7.6	16.0	.303	.848	.00867	-.00101	.00076		
1722	-8.0	-4.0	6.5	14.1	.301	.847	.00723	-.00097	.00060		
1723	-8.0	-4.4	7.0	15.0	.302	.848	.00773	-.00106	.00067		
1724	-8.0	-4.8	7.4	16.0	.301	.847	.00827	-.00116	.00076		
1725	-8.0	-3.0	5.6	12.0	.302	.848	.00593	-.00072	.00046		
1726	-8.0	-2.1	4.7	10.0	.302	.848	.00459	-.00051	.00035		
1727	-8.0	-1.3	3.8	8.0	.302	.848	.00318	-.00030	.00025		
1728	-5.0	-1.4	4.8	8.0	.353	.880	.00363	-.00016	.00023		
1729	-5.0	-2.3	5.7	10.0	.353	.878	.00499	-.00031	.00032		
1730	-5.0	-3.3	6.9	12.0	.353	.878	.00620	-.00047	.00043		
1731	-5.0	-4.3	7.9	14.0	.354	.879	.00733	-.00063	.00057		
1732	-5.0	-4.7	8.4	15.0	.352	.878	.00779	-.00070	.00065		
1733	-9.2	-1.7	5.0	10.0	.350	.878	.00330	-.00036	.00031		
1734	-9.2	-2.6	6.0	12.0	.351	.878	.00463	-.00061	.00044		
1735	-9.2	-3.6	6.9	14.0	.350	.878	.00592	-.00085	.00058		
1736	-9.2	-4.0	7.4	15.0	.350	.878	.00651	-.00096	.00066		
1737	-9.2	-4.5	7.9	16.0	.350	.877	.00709	-.00108	.00074		
1738	-10.6	-4.6	8.8	17.4	.399	.914	.00649	-.00109	.00084		

Table 11. Rotor Performance Data for Advanced Stiff Blade Set
With $I_b = 0.4186$ slug-ft 2

(a) $\rho = 0.0023$ slug/ft 3 (atmospheric air); $M_T = 0.284$; $\gamma = 5.89$

RUN	18	HOVER	(AIR)	C_T	C_Q
POINT	A ₁	B ₁	θ		
348	.1	.0	4.0	.00256	.00022
349	.1	.0	6.0	.00390	.00030
350	.0	.0	8.0	.00540	.00043
351	.0	.0	10.0	.00694	.00058
352	.0	.0	12.0	.00868	.00076
353	.0	-.1	14.0	.01038	.00099
354	.0	-.1	16.0	.01203	.00124
355	-.1	-.1	17.0	.01287	.00140
356	.0	.0	18.0	.01360	.00159
357	-.4	.8	18.0	.01361	.00158
358	-.5	.7	19.0	.01442	.00179
359	-.5	.7	20.0	.01496	.00201
360	-.5	.7	21.0	.01554	.00226
361	-.5	.7	19.0	.01425	.00179
362	-.5	.7	17.0	.01293	.00144
363	-.4	.8	15.0	.01123	.00116
364	-.3	.4	13.0	.00958	.00092
365	-.4	.4	12.0	.00878	.00081
366	-.4	.4	10.0	.00702	.00061
367	-.4	.4	8.0	.00543	.00045
368	-.5	.4	6.0	.00390	.00032
369	-.5	.4	4.0	.00252	.00022

(b) $\rho = 0.00382$ slug/ft 3 ; $M_T = 0.65$; $\gamma = 9.78$

RUN	19	HOVER			
POINT	A ₁	B ₁	θ	C_T	C_Q
373	.8	.8	1.9	.00167	.00017
374	.8	1.1	4.0	.00291	.00023
375	.8	.9	6.1	.00425	.00033
376	.9	.9	7.9	.00569	.00044
377	.7	.9	10.0	.00722	.00060
378	.6	.9	12.1	.00885	.00079
379	.2	.8	14.0	.01043	.00102
380	.2	.8	16.0	.01198	.00130
382	-.2	.3	7.9	.00567	.00045
383	-.4	.3	3.9	.00278	.00023
384	-.5	.3	8.0	.00575	.00046

Table 11. Continued

(b) Continued

RUN	20	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
388	-1.8	-3.9	1.7	5.6	.150	.755	.00652	.00017	.00029		
389	-1.8	-4.7	2.0	7.9	.148	.754	.00847	.00025	.00041		
390	-1.8	-5.4	2.4	9.9	.148	.753	.01013	.00033	.00055		
391	-1.8	-6.1	2.7	11.9	.151	.756	.01167	.00044	.00073		
392	-1.8	-6.8	3.2	13.9	.150	.754	.01314	.00057	.00095		
393	-1.8	-7.5	3.3	14.9	.150	.754	.01376	.00064	.00108		
394	-1.8	-8.0	3.5	15.9	.150	.754	.01425	.00071	.00122		
395	-1.8	-3.3	1.5	3.9	.150	.756	.00521	.00010	.00023		
396	-1.8	-2.6	1.1	1.9	.153	.757	.00353	.00004	.00018		
397	.0	-2.8	1.1	1.9	.150	.755	.00393	.00006	.00017		
398	.0	-3.5	1.4	4.0	.145	.752	.00574	.00006	.00023		
399	.0	-4.2	1.7	5.9	.146	.753	.00743	.00005	.00031		
400	.0	-4.9	2.0	7.9	.148	.754	.00916	.00004	.00042		
401	.0	-5.6	2.4	9.9	.150	.755	.01072	.00001	.00056		
402	.0	-6.3	2.7	11.9	.151	.753	.01228	.00004	.00074		
403	.0	-7.2	3.2	13.9	.150	.754	.01356	.00016	.00095		
404	.0	-7.7	3.4	14.9	.150	.754	.01415	.00022	.00109		
406	-5.0	-7.5	3.4	15.9	.149	.756	.01369	.00139	.00125		
407	-5.0	-6.5	3.0	13.9	.146	.753	.01244	.00116	.00099		
408	-5.0	-5.7	2.6	11.9	.150	.754	.01107	.00095	.00079		
409	-5.0	-5.0	2.3	9.9	.146	.753	.00955	.00076	.00061		
410	-5.0	-4.4	2.0	7.8	.146	.752	.00786	.00060	.00047		
411	-5.0	-3.6	1.7	5.9	.148	.754	.00617	.00044	.00035		
412	-5.0	-2.9	1.4	3.9	.150	.754	.00457	.00028	.00027		
413	-5.0	-2.2	1.2	1.8	.150	.754	.00277	.00012	.00020		
414	-4.0	-3.7	2.5	6.0	.202	.790	.00655	.00034	.00034		
415	-3.3	-3.8	2.6	5.9	.202	.789	.00670	.00028	.00033		
416	-3.3	-4.7	3.0	7.8	.202	.789	.00845	.00041	.00043		
417	-3.3	-5.4	3.5	9.9	.200	.787	.01014	.00055	.00056		
418	-3.3	-6.2	4.0	12.0	.200	.788	.01171	.00069	.00073		
419	-3.3	-7.3	4.5	13.9	.199	.788	.01294	.00089	.00093		
421	-3.3	-8.6	5.1	15.9	.201	.789	.01398	.00111	.00121		
422	-3.3	-3.1	2.2	3.9	.204	.792	.00487	.00017	.00024		
423	-3.3	-2.3	1.6	1.9	.203	.791	.00311	.00006	.00019		
424	.0	-2.7	1.7	1.9	.203	.789	.00414	.00010	.00017		
425	.0	-3.4	2.2	3.9	.201	.789	.00601	.00008	.00022		
426	.0	-4.3	2.6	5.9	.202	.790	.00779	.00005	.00028		
427	.0	-5.1	3.0	7.9	.201	.789	.00956	.00001	.00038		
428	.0	-5.8	3.5	9.8	.202	.790	.01118	.00004	.00050		
429	.0	-6.7	3.9	11.9	.201	.789	.01274	.00011	.00067		
431	.0	-9.0	5.2	15.9	.202	.790	.01479	.00044	.00118		
432	-5.0	-6.2	3.9	11.9	.201	.790	.01106	.00103	.00073		
433	-5.0	-7.0	4.5	13.9	.200	.789	.01252	.00123	.00094		
434	-5.0	-8.3	5.0	15.9	.201	.787	.01366	.00148	.00123		
435	-5.0	-5.1	3.5	9.9	.201	.790	.00952	.00081	.00057		

Table 11. Continued

(b) Continued

RUN	20	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
436	-5.0	-4.4	3.0	7.9	.201	.790	.00782	-.00063	.00044		
437	-5.0	-3.6	2.5	5.9	.204	.791	.00612	-.00045	.00033		
438	-5.0	-2.8	2.1	3.9	.203	.789	.00435	-.00028	.00025		
439	-5.0	-2.0	1.6	1.9	.203	.790	.00257	-.00012	.00019		
RUN	27	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
634	-5.2	-2.8	2.4	3.9	.256	.821	.00367	-.00023	.00023		
635	-5.2	-3.7	3.1	5.9	.256	.821	.00533	-.00041	.00031		
636	-4.5	-4.2	3.4	6.9	.254	.820	.00657	-.00044	.00035		
637	-5.2	-4.5	3.7	8.0	.254	.821	.00716	-.00059	.00041		
638	-5.2	-5.4	4.3	10.0	.254	.820	.00886	-.00079	.00053		
639	-5.2	-6.3	4.9	11.9	.254	.820	.01044	-.00098	.00068		
640	-5.2	-7.4	5.5	13.9	.255	.822	.01175	-.00119	.00089		
641	-5.2	-8.8	6.3	15.9	.256	.823	.01275	-.00146	.00117		
642	-6.2	-6.3	6.0	11.9	.307	.857	.00931	-.00100	.00068		
643	-6.2	-7.5	6.6	13.9	.306	.856	.01051	-.00123	.00089		
644	-6.2	-8.8	7.4	16.0	.306	.855	.01163	-.00150	.00118		
645	-6.2	-5.2	5.2	10.0	.307	.857	.00777	-.00078	.00053		
646	-6.7	-4.6	4.7	8.7	.306	.857	.00649	-.00068	.00046		
647	-6.2	-3.4	3.6	5.9	.308	.856	.00443	-.00036	.00031		
648	-6.2	-2.4	2.8	3.9	.308	.856	.00275	-.00015	.00023		
RUN	28	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
653	-7.4	-2.4	2.2	3.9	.255	.821	.00281	-.00026	.00022		
654	-7.5	-3.2	3.0	5.9	.257	.822	.00461	-.00051	.00031		
655	-7.5	-4.1	3.5	7.9	.257	.822	.00630	-.00075	.00042		
656	-7.5	-5.0	4.2	10.0	.255	.821	.00803	-.00102	.00056		
657	-7.5	-5.8	4.8	11.9	.254	.820	.00961	-.00126	.00071		
658	-7.5	-6.9	5.4	13.9	.255	.821	.01102	-.00154	.00091		
659	-7.5	-8.3	6.0	15.9	.253	.821	.01205	-.00181	.00117		
660	-6.5	-4.7	4.5	8.6	.306	.856	.00650	-.00065	.00044		
661	-6.5	-4.7	4.5	8.6	.307	.856	.00653	-.00065	.00045		
662	-8.0	-4.1	4.1	7.9	.306	.855	.00536	-.00064	.00041		
663	-8.0	-4.9	4.9	9.9	.306	.856	.00704	-.00090	.00055		
664	-8.0	-5.9	5.6	11.9	.306	.855	.00855	-.00117	.00070		
665	-8.0	-7.0	6.4	13.9	.307	.855	.00993	-.00144	.00090		
666	-8.0	-8.4	7.0	15.9	.306	.855	.01106	-.00171	.00117		
667	-8.0	-3.1	3.3	6.0	.306	.855	.00381	-.00038	.00031		
668	-8.0	-2.2	2.5	3.9	.308	.856	.00207	-.00012	.00022		

Table 11. Continued

(b) Concluded

RUN	22	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
484	-9.2	-3.5	4.5	8.0	.354	.883	.00410	-.00049	.00038		
485	-9.2	-4.4	5.5	10.0	.355	.883	.00559	-.00077	.00051		
486	-9.2	-5.4	6.4	12.0	.356	.884	.00712	-.00106	.00067		
487	-9.2	-6.5	7.2	14.0	.354	.884	.00857	-.00135	.00086		
488	-9.2	-8.0	7.8	16.0	.355	.885	.00969	-.00164	.00110		
489	-8.7	-5.0	5.8	10.8	.356	.884	.00640	-.00084	.00057		
490	-5.1	-5.4	6.0	10.0	.357	.884	.00750	-.00055	.00049		
491	-5.1	-6.4	6.9	12.1	.358	.884	.00901	-.00073	.00064		
492	-5.1	-7.8	7.8	14.1	.359	.883	.01019	-.00097	.00087		
493	-5.1	-8.5	8.0	15.0	.357	.882	.01071	-.00107	.00099		
494	-5.1	-9.4	8.3	16.0	.358	.884	.01117	-.00121	.00114		
495	-5.1	-4.3	5.0	8.0	.356	.885	.00608	-.00036	.00038		
496	-11.8	-3.7	5.5	10.1	.401	.922	.00349	-.00048	.00044		
497	-11.8	-4.7	6.4	12.0	.402	.923	.00479	-.00083	.00060		
498	-11.8	-5.8	7.3	14.0	.402	.923	.00625	-.00121	.00080		
499	-11.8	-7.0	8.0	16.0	.403	.923	.00772	-.00160	.00104		
500	-11.8	-8.7	8.5	18.0	.405	.920	.00886	-.00194	.00132		
501	-11.2	-6.0	7.2	13.8	.404	.922	.00642	-.00118	.00078		
502	-8.1	-6.7	7.5	14.0	.409	.923	.00814	-.00107	.00082		
503	-8.1	-8.5	8.5	16.0	.408	.921	.00922	-.00136	.00108		
504	-8.1	-9.4	8.6	17.0	.410	.920	.00989	-.00148	.00124		
505	-8.1	-5.6	6.8	12.0	.409	.921	.00670	-.00079	.00066		
506	-8.1	-4.6	6.0	10.0	.407	.920	.00518	-.00053	.00051		

Table 11. Continued

(c) $\rho = 0.006 \text{ slug/ft}^3$; $M_T = 0.65$; $\gamma = 15.36$

RUN	23	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
510	.1	-2.8	1.0	2.0	.148	.754	.00318	.00007	.00017		
511	.1	-3.5	1.1	4.1	.147	.753	.00477	.00006	.00021		
512	.1	-4.2	1.3	6.1	.147	.753	.00630	.00005	.00027		
513	.1	-5.0	1.4	8.0	.146	.753	.00779	.00003	.00035		
514	.1	-5.7	1.6	10.1	.146	.752	.00931	.00002	.00046		
515	.1	-6.4	1.6	12.0	.148	.754	.01064	-.00001	.00059		
516	.1	-6.7	1.7	13.0	.151	.755	.01135	-.00003	.00066		
517	-1.9	-5.4	1.6	10.0	.148	.754	.00893	-.00027	.00048		
518	-1.8	-6.1	1.7	12.0	.148	.754	.01028	-.00034	.00061		
519	-1.9	-6.5	1.7	13.0	.148	.754	.01089	-.00038	.00068		
520	-1.8	-4.8	1.4	8.0	.146	.753	.00746	-.00020	.00038		
521	-1.9	-4.4	1.3	6.7	.150	.755	.00649	-.00016	.00032		
522	-1.8	-3.2	1.2	4.0	.148	.754	.00446	-.00007	.00023		
523	-1.8	-2.6	1.1	2.0	.151	.753	.00292	-.00001	.00019		
524	-5.0	-2.3	1.1	2.1	.147	.753	.00232	-.00010	.00020		
525	-5.0	-2.9	1.2	4.0	.146	.752	.00382	-.00025	.00024		
526	-5.0	-3.7	1.3	6.1	.147	.755	.00535	-.00039	.00031		
527	-5.0	-4.3	1.4	8.0	.146	.754	.00678	-.00052	.00040		
528	-5.0	-5.1	1.6	10.0	.147	.755	.00830	-.00067	.00052		
529	-5.0	-5.8	1.7	12.0	.149	.755	.00965	-.00082	.00064		
530	-5.0	-6.1	1.7	13.0	.148	.755	.01031	-.00088	.00072		
531	-5.0	-6.5	1.8	14.0	.148	.755	.01091	-.00096	.00079		
532	-5.0	-5.3	2.6	10.0	.199	.787	.00833	-.00065	.00050		
533	-5.0	-6.1	2.8	12.1	.200	.788	.00982	-.00081	.00062		
535	-5.0	-4.4	2.3	8.1	.199	.789	.00684	-.00047	.00039		
536	-5.0	-3.6	2.1	6.0	.200	.789	.00526	-.00031	.00030		
537	-5.0	-2.8	1.8	4.0	.202	.791	.00365	-.00016	.00024		
538	-5.0	-1.8	1.5	2.0	.202	.791	.00208	.00000	.00019		
539	-3.3	-2.1	1.5	2.0	.201	.789	.00253	.00002	.00019		
540	-3.3	-2.9	1.8	4.1	.200	.788	.00418	-.00009	.00023		
541	-3.3	-4.3	2.2	7.0	.198	.788	.00647	-.00028	.00033		
544	-3.3	-4.6	2.3	8.0	.198	.789	.00733	-.00035	.00036		
545	-3.3	-5.4	2.6	10.0	.197	.788	.00882	-.00046	.00046		
546	-3.3	-6.4	2.8	12.1	.197	.787	.01024	-.00060	.00059		
547	-3.3	-6.8	2.9	13.0	.198	.787	.01089	-.00067	.00066		
548	.0	-5.9	2.6	10.1	.199	.788	.00987	.00002	.00042		
549	.0	-6.8	2.8	12.1	.198	.788	.01125	-.00003	.00053		
550	.0	-5.1	2.4	8.0	.200	.790	.00826	.00003	.00032		
551	.0	-4.2	2.1	6.0	.200	.789	.00672	.00007	.00024		
552	.0	-3.4	1.8	4.0	.200	.789	.00510	.00009	.00019		
553	.0	-2.6	1.5	2.1	.202	.790	.00345	.00010	.00016		

Table 11. Continued

(c) Continued

RUN	24	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
557	.1	557	.1	-2.3	2.0	2.0	.251	.822	.00340	.00012	.00015
558	.1	558	.1	-3.2	2.5	4.0	.249	.822	.00513	.00010	.00017
559	.1	559	.1	-4.2	2.8	5.9	.250	.823	.00672	.00007	.00021
560	.1	560	.1	-5.2	3.2	8.0	.252	.823	.00844	.00004	.00028
561	.1	561	.1	-6.0	3.7	10.0	.252	.823	.00988	.00000	.00036
562	.1	562	.1	-6.5	3.9	11.0	.251	.823	.01064	-.00001	.00041
563	.1	563	.1	-7.0	4.0	12.0	.249	.822	.01135	-.00003	.00047
564	-4.2	564	-4.2	-4.4	3.1	7.6	.252	.822	.00650	-.00042	.00033
567	-5.2	567	-5.2	-4.4	3.2	8.0	.251	.823	.00638	-.00053	.00036
568	-5.2	568	-5.2	-5.3	3.6	9.9	.250	.822	.00789	-.00070	.00046
569	-5.2	569	-5.2	-6.3	3.9	12.0	.250	.822	.00937	-.00087	.00058
570	-5.2	570	-5.2	-7.4	4.2	14.0	.249	.822	.01070	-.00106	.00072
571	-5.2	571	-5.2	-7.9	4.3	15.0	.249	.822	.01127	-.00115	.00080
572	-5.2	572	-5.2	-3.5	2.8	5.9	.252	.823	.00479	-.00035	.00028
573	-5.2	573	-5.2	-2.5	2.3	4.0	.252	.823	.00326	-.00018	.00022
574	-5.2	574	-5.2	-1.6	1.8	2.0	.252	.823	.00169	-.00001	.00018
575	-7.5	575	-7.5	-2.2	2.2	3.9	.249	.822	.00243	-.00019	.00022
576	-7.5	576	-7.5	-3.1	2.6	5.9	.250	.823	.00402	-.00042	.00029
577	-7.5	577	-7.5	-4.0	3.1	7.9	.250	.823	.00555	-.00066	.00038
578	-7.5	578	-7.5	-4.9	3.5	10.0	.249	.823	.00711	-.00088	.00049
579	-7.5	579	-7.5	-5.9	3.9	12.0	.249	.822	.00855	-.00112	.00061
580	-7.5	580	-7.5	-7.0	4.1	14.0	.248	.822	.00993	-.00136	.00076

Table 11. Continued

(c) Concluded

RUN 25

POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
584	-6.2	-4.1	3.7	8.0	.302	.851	.00541	-.00045	.00037
585	-6.2	-5.2	4.2	10.0	.301	.851	.00679	-.00065	.00046
586	-6.2	-6.2	4.7	12.0	.303	.849	.00825	-.00085	.00058
587	-6.2	-7.2	5.2	14.0	.302	.848	.00959	-.00104	.00071
588	-6.3	-8.8	5.4	16.0	.301	.848	.01071	-.00129	.00091
589	-6.4	-4.8	4.1	9.5	.302	.848	.00640	-.00060	.00045
590	.0	-5.2	4.0	8.0	.304	.847	.00805	.00009	.00027
591	.0	-6.2	4.7	10.0	.304	.846	.00952	.00003	.00035
592	.0	-7.3	5.2	12.0	.303	.847	.01080	-.00006	.00046
593	.0	-8.5	5.6	14.0	.302	.847	.01189	-.00016	.00061
594	.0	-4.1	3.4	6.0	.303	.848	.00656	.00012	.00021
595	.0	-3.0	2.7	4.0	.303	.848	.00494	.00015	.00017
596	-8.0	-2.8	3.1	6.1	.299	.848	.00320	-.00030	.00029
597	-8.1	-3.7	3.6	8.0	.300	.849	.00465	-.00053	.00037
598	-8.1	-4.8	4.1	9.9	.300	.849	.00606	-.00077	.00047
599	-8.1	-5.9	4.7	12.0	.301	.848	.00747	-.00103	.00060
600	-8.1	-6.9	5.1	14.0	.302	.848	.00885	-.00127	.00074
601	-8.1	-8.3	5.3	16.0	.302	.846	.01003	-.00153	.00091

RUN 26

POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
609	-9.2	-3.4	4.0	7.8	.353	.883	.00346	-.00037	.00034
610	-9.2	-4.5	4.7	9.8	.352	.882	.00482	-.00063	.00045
611	-9.2	-5.6	5.2	11.8	.351	.883	.00614	-.00089	.00058
612	-9.2	-6.8	5.8	13.8	.351	.883	.00752	-.00117	.00072
613	-9.2	-8.3	6.2	15.8	.352	.883	.00859	-.00144	.00090
614	-8.6	-5.7	5.3	11.8	.353	.882	.00644	-.00085	.00058
615	-5.1	-5.4	5.0	9.8	.356	.883	.00662	-.00046	.00043
616	-5.1	-6.7	5.6	11.9	.355	.882	.00793	-.00065	.00054
617	-5.2	-7.9	6.1	13.9	.355	.882	.00922	-.00084	.00068
618	-5.1	-8.6	6.3	14.9	.354	.882	.00970	-.00095	.00077
619	-5.1	-4.3	4.3	7.8	.355	.882	.00519	-.00030	.00034
620	-11.8	-3.6	4.8	9.8	.400	.916	.00287	-.00033	.00038
621	-11.8	-4.8	5.5	11.8	.401	.917	.00413	-.00066	.00053
622	-11.8	-6.1	6.0	13.8	.399	.916	.00540	-.00100	.00069
625	-10.5	-7.0	6.3	14.5	.403	.915	.00646	-.00110	.00077
626	-8.1	-7.3	6.3	13.9	.406	.916	.00702	-.00092	.00071
627	-8.1	-8.8	6.7	15.8	.407	.915	.00811	-.00115	.00089
628	-8.1	-4.6	5.2	9.8	.405	.915	.00447	-.00041	.00045
629	-8.1	-5.8	5.7	11.8	.404	.915	.00574	-.00064	.00057

Table 11. Continued

(d) $\rho = 0.0076 \text{ slug/ft}^3$; $M_T = 0.65$; $\gamma = 19.20$

RUN	29	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
674	.0	-2.5	1.1	2.0	.146	.748	.00300	.00007	.00017		
675	.0	-3.3	1.1	4.0	.146	.748	.00448	.00005	.00020		
676	.0	-4.1	1.2	5.9	.145	.747	.00596	.00003	.00025		
677	.0	-4.8	1.3	7.9	.146	.748	.00734	.00001	.00033		
678	.1	-5.5	1.2	9.9	.145	.749	.00872	.00000	.00042		
679	.1	-5.8	1.2	10.9	.144	.748	.00935	-.00001	.00047		
680	-1.8	-2.4	1.2	1.9	.146	.751	.00268	-.00001	.00017		
681	-1.8	-3.1	1.1	4.0	.146	.751	.00420	-.00007	.00021		
682	-1.7	-4.3	1.1	7.1	.146	.749	.00650	-.00015	.00031		
683	-1.8	-5.4	1.2	10.0	.146	.751	.00841	-.00026	.00044		
685	-1.8	-6.0	1.2	12.0	.144	.748	.00971	-.00033	.00056		
686	-1.8	-4.6	1.2	7.9	.144	.748	.00704	-.00019	.00035		
687	-1.8	-3.9	1.2	6.0	.146	.749	.00568	-.00013	.00027		
688	-5.0	-2.8	1.1	3.9	.147	.751	.00358	-.00025	.00023		
689	-5.0	-3.5	1.2	5.9	.146	.749	.00503	-.00039	.00029		
690	-5.0	-4.3	1.2	7.9	.143	.748	.00643	-.00052	.00037		
691	-5.0	-4.9	1.2	9.9	.144	.748	.00782	-.00065	.00047		
692	-5.0	-4.9	1.2	10.0	.144	.749	.00783	-.00064	.00047		
693	-5.0	-5.6	1.2	11.9	.146	.749	.00907	-.00077	.00058		
694	-5.0	-6.0	1.3	12.9	.144	.749	.00966	-.00084	.00064		
695	-5.0	-5.2	2.3	9.8	.198	.785	.00777	-.00064	.00045		
696	-5.0	-6.1	2.4	12.0	.198	.785	.00913	-.00079	.00056		
697	-5.0	-6.5	2.4	12.9	.196	.783	.00979	-.00086	.00062		
698	-5.0	-4.3	2.2	7.9	.198	.784	.00640	-.00047	.00036		
699	-5.0	-3.4	2.0	5.9	.199	.786	.00489	-.00031	.00028		
700	-5.0	-2.5	1.8	3.9	.199	.786	.00340	-.00016	.00023		
701	-3.3	-2.7	1.8	3.9	.199	.784	.00384	-.00009	.00022		
702	-3.3	-3.6	2.0	5.9	.198	.784	.00537	-.00020	.00027		
703	-2.9	-4.3	2.1	7.3	.198	.785	.00650	-.00025	.00031		
704	-3.3	-4.5	2.1	8.0	.198	.784	.00687	-.00033	.00034		
707	-3.3	-6.2	2.3	12.0	.197	.784	.00961	-.00055	.00054		
708	.0	-4.9	2.1	7.9	.198	.784	.00774	.00005	.00030		
709	.0	-5.7	2.3	9.9	.197	.784	.00917	.00001	.00038		
710	.0	-4.0	1.9	5.9	.199	.786	.00623	.00007	.00023		
711	.0	-3.2	1.7	3.9	.200	.786	.00474	.00009	.00019		
712	.0	-2.3	1.6	1.9	.199	.786	.00313	.00012	.00017		

Table 11. Continued

(d) Continued

RUN	30	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
716	.0	-5.0	2.8	7.9	.249	.818	.00736	.00007	.00027		
717	.0	-6.0	3.2	9.9	.248	.817	.00876	.00004	.00035		
718	.0	-6.4	3.3	10.9	.249	.816	.00943	.00002	.00038		
719	.0	-4.0	2.5	5.9	.250	.817	.00595	.00010	.00022		
720	.0	-2.9	2.1	3.9	.251	.818	.00449	.00014	.00019		
721	-4.2	-4.6	3.0	8.6	.248	.816	.00644	-.00039	.00036		
722	-5.2	-4.1	2.9	8.0	.248	.816	.00566	-.00042	.00035		
723	-5.2	-5.2	3.2	9.9	.248	.816	.00698	-.00058	.00043		
724	-5.2	-6.1	3.4	11.9	.246	.815	.00829	-.00073	.00053		
725	-5.2	-6.7	3.5	12.9	.248	.816	.00891	-.00081	.00058		
726	-5.2	-3.1	2.6	5.9	.249	.816	.00422	-.00025	.00027		
727	-7.5	-2.7	2.5	5.9	.249	.817	.00350	-.00032	.00028		
728	-7.5	-3.8	2.8	8.0	.248	.817	.00494	-.00054	.00036		
729	-7.5	-4.7	3.1	9.9	.248	.817	.00622	-.00073	.00045		
730	-7.5	-5.8	3.4	11.9	.248	.816	.00751	-.00095	.00056		
731	-7.5	-6.8	3.5	13.9	.248	.816	.00876	-.00117	.00067		
732	-6.1	-3.9	3.4	7.9	.299	.849	.00478	-.00037	.00034		
733	-6.1	-4.9	4.0	9.9	.299	.849	.00605	-.00055	.00043		
734	-6.2	-6.2	4.3	11.9	.298	.848	.00730	-.00074	.00053		
737	-6.1	-5.2	4.1	10.4	.298	.848	.00634	-.00058	.00045		
738	-7.9	-4.6	3.8	9.9	.298	.848	.00539	-.00062	.00044		
739	-7.9	-5.8	4.2	11.9	.298	.848	.00672	-.00085	.00055		
740	-8.0	-6.9	4.5	13.9	.297	.848	.00790	-.00108	.00067		
741	-7.9	-3.5	3.4	7.9	.295	.847	.00410	-.00039	.00035		
742	.0	-5.0	3.7	7.9	.299	.847	.00714	.00011	.00024		
743	.1	-6.0	4.2	9.9	.299	.847	.00849	.00005	.00031		
744	.0	-7.1	4.6	11.9	.299	.847	.00966	-.00003	.00039		
745	.1	-3.9	3.1	5.9	.300	.848	.00575	.00012	.00019		

Table 11. Continued

(d) Concluded

RUN	31	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
749	-4.9	-2.7	3.5	5.9	.350	.881	.00324	-.00008	.00025		
750	-4.9	-4.0	4.1	8.0	.350	.881	.00470	-.00025	.00032		
751	-4.9	-5.2	4.7	9.9	.350	.880	.00584	-.00040	.00039		
752	-4.9	-6.4	5.2	11.9	.351	.880	.00706	-.00057	.00048		
753	-4.9	-7.8	5.6	13.9	.350	.880	.00823	-.00074	.00059		
754	-4.9	-8.1	5.6	14.5	.349	.880	.00855	-.00078	.00063		
755	-9.2	-3.1	3.7	8.0	.346	.879	.00305	-.00028	.00032		
756	-9.2	-4.2	4.4	9.9	.347	.880	.00421	-.00051	.00042		
757	-9.2	-5.5	4.9	12.0	.347	.880	.00544	-.00076	.00054		
758	-7.7	-6.4	5.1	12.8	.345	.881	.00650	-.00079	.00057		
761	-9.2	-6.1	5.0	12.9	.346	.883	.00599	-.00087	.00060		
762	-7.9	-3.0	4.2	7.9	.397	.915	.00272	-.00007	.00032		
764	-7.9	-4.2	4.9	10.0	.398	.916	.00398	-.00031	.00042		
765	-8.0	-5.5	5.5	12.0	.397	.916	.00506	-.00053	.00052		
766	-8.0	-7.0	5.9	14.0	.397	.916	.00623	-.00076	.00064		
767	-11.7	-3.3	4.6	10.0	.392	.915	.00250	-.00020	.00036		
768	-11.7	-4.6	5.2	11.9	.392	.915	.00357	-.00047	.00048		
769	-11.7	-6.1	5.7	14.0	.393	.916	.00470	-.00078	.00063		

Table 11. Continued

(e) $\rho = 0.009 \text{ slug/ft}^3$; $M_T = 0.65$; $\gamma = 23.04$

RUN	32	POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
773	.0	773	.0	-2.4	1.1	2.0	.144	.746	.00271	.00008	.00016
774	.0	774	.0	-3.2	1.1	4.0	.143	.745	.00410	.00006	.00019
775	.0	775	.0	-4.0	1.1	6.0	.145	.747	.00545	.00004	.00023
776	.0	776	.0	-4.8	1.1	7.9	.144	.746	.00670	.00001	.00029
777	.1	777	.1	-5.1	1.1	8.9	.145	.747	.00733	.00001	.00033
778	.1	778	.1	-5.5	1.1	10.0	.144	.746	.00799	.00000	.00037
779	-1.8	779	-1.8	-2.3	1.2	2.0	.146	.748	.00240	.00000	.00017
780	-1.8	780	-1.8	-3.0	1.1	4.1	.145	.747	.00381	-.00006	.00020
781	-1.8	781	-1.8	-3.8	1.1	6.0	.145	.747	.00512	-.00011	.00024
782	-1.8	782	-1.8	-3.0	1.1	4.0	.146	.747	.00381	-.00005	.00020
783	-1.6	783	-1.6	-4.5	1.2	8.1	.143	.745	.00651	-.00015	.00031
784	-1.8	784	-1.8	-5.3	1.1	10.0	.143	.746	.00760	-.00024	.00039
785	-1.8	785	-1.8	-5.7	1.0	10.9	.145	.747	.00817	-.00027	.00043
786	-5.0	786	-5.0	-1.9	1.2	2.0	.145	.748	.00189	-.00008	.00018
787	-5.0	787	-5.0	-2.6	1.2	4.0	.145	.748	.00322	-.00021	.00021
788	-5.0	788	-5.0	-3.5	1.1	5.9	.144	.747	.00446	-.00034	.00026
789	-5.0	789	-5.0	-4.2	1.1	8.0	.143	.746	.00581	-.00046	.00033
790	-5.0	790	-5.0	-4.9	1.1	9.9	.143	.746	.00703	-.00059	.00041
791	-5.0	791	-5.0	-5.3	1.1	11.0	.141	.745	.00762	-.00065	.00046
792	-5.0	792	-5.0	-5.7	1.0	11.8	.143	.746	.00812	-.00072	.00051
793	-5.0	793	-5.0	-2.4	1.7	3.9	.195	.781	.00297	-.00014	.00021
794	-5.0	794	-5.0	-3.2	1.9	6.0	.195	.780	.00439	-.00028	.00026
795	-5.0	795	-5.0	-4.2	1.9	8.0	.196	.781	.00570	-.00043	.00032
798	-5.0	798	-5.0	-5.1	2.2	10.0	.197	.781	.00698	-.00058	.00040
799	-5.0	799	-5.0	-5.4	2.2	11.0	.196	.781	.00765	-.00064	.00045
800	-5.0	800	-5.0	-5.9	2.2	11.9	.196	.780	.00814	-.00071	.00049
801	-3.3	801	-3.3	-2.6	1.8	4.0	.197	.781	.00343	-.00008	.00020
802	-3.3	802	-3.3	-3.5	1.8	6.0	.198	.781	.00484	-.00018	.00025
803	-3.3	803	-3.3	-4.4	2.0	8.0	.197	.781	.00618	-.00029	.00031
804	-2.5	804	-2.5	-4.6	1.9	8.0	.197	.781	.00640	-.00023	.00030
805	-3.3	805	-3.3	-5.3	2.1	9.9	.197	.781	.00740	-.00041	.00038
806	-3.3	806	-3.3	-5.7	2.1	11.0	.196	.780	.00805	-.00045	.00042
807	.0	807	.0	-2.1	1.5	2.0	.198	.781	.00283	.00012	.00016
808	.0	808	.0	-3.1	1.6	4.0	.197	.781	.00424	.00010	.00018
809	.0	809	.0	-4.0	1.8	5.9	.196	.780	.00561	.00007	.00022
810	.0	810	.0	-4.8	2.0	7.9	.196	.780	.00697	.00004	.00027
811	.0	811	.0	-5.7	2.1	9.9	.196	.780	.00824	.00000	.00034

Table 11. Continued

(e) Continued

RUN	33	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
815	.1	-1.9	1.8	2.1	.247	.814	.00269	.00015	.00016		
816	.1	-2.9	2.1	4.1	.249	.815	.00419	.00012	.00017		
817	.1	-3.9	2.4	6.0	.248	.815	.00558	.00009	.00019		
818	.1	-4.9	2.7	8.0	.248	.815	.00692	.00006	.00024		
819	.1	-5.9	2.9	10.0	.248	.815	.00824	.00003	.00029		
820	-5.2	-2.1	2.1	4.0	.248	.815	.00252	-.00009	.00021		
822	-5.2	-4.0	2.6	8.0	.247	.814	.00528	-.00039	.00031		
823	-5.2	-4.0	2.6	8.0	.247	.814	.00528	-.00039	.00031		
824	-4.0	-4.9	2.8	9.4	.247	.814	.00650	-.00039	.00035		
825	-5.2	-5.0	3.0	10.1	.247	.814	.00658	-.00054	.00039		
826	-5.2	-6.2	3.1	12.0	.247	.814	.00774	-.00070	.00048		
827	-7.5	-1.8	2.1	4.0	.246	.814	.00188	-.00009	.00021		
828	-7.5	-2.6	2.4	6.0	.246	.814	.00324	-.00029	.00026		
829	-7.5	-3.7	2.7	8.0	.247	.815	.00455	-.00050	.00033		
830	-7.5	-4.7	2.9	10.0	.247	.815	.00579	-.00070	.00041		
831	-7.5	-5.8	3.1	12.0	.245	.814	.00701	-.00090	.00050		
832	-7.5	-6.3	3.2	13.0	.245	.814	.00759	-.00100	.00056		
833	-7.9	-2.2	2.8	6.0	.296	.847	.00248	-.00015	.00025		
834	-7.9	-3.4	3.2	8.0	.296	.848	.00380	-.00038	.00032		
835	-7.9	-4.5	3.6	10.0	.296	.848	.00504	-.00059	.00041		
836	-8.0	-5.8	3.9	12.1	.297	.848	.00620	-.00081	.00050		
837	-8.0	-6.2	4.0	13.0	.296	.848	.00682	-.00091	.00055		
838	-6.2	-1.6	2.4	4.1	.297	.847	.00183	.00001	.00021		
839	-6.2	-2.6	2.8	6.0	.297	.846	.00305	-.00016	.00026		
840	-6.2	-3.8	3.2	8.1	.297	.847	.00442	-.00034	.00032		
841	-6.2	-4.9	3.6	10.0	.297	.846	.00560	-.00052	.00039		
842	-5.7	-5.5	3.8	11.0	.298	.847	.00644	-.00058	.00043		
843	-6.2	-6.0	3.9	12.0	.298	.847	.00686	-.00070	.00048		
844	-6.2	-6.5	4.1	13.1	.297	.846	.00751	-.00079	.00053		

Table 11. Concluded

(e) Concluded

RUN	34								
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
850	.0	-3.7	2.9	6.0	.298	.848	.00535	.00013	.00019
851	.0	-4.9	3.5	8.0	.299	.847	.00667	.00007	.00023
852	.0	-5.9	4.0	10.0	.298	.847	.00789	.00003	.00028
853	.0	-6.5	4.2	11.0	.298	.846	.00850	-.00001	.00031
854	-9.2	-2.7	3.7	8.1	.344	.878	.00273	-.00021	.00031
855	-9.2	-3.9	4.2	10.0	.342	.878	.00389	-.00044	.00040
856	-9.2	-5.2	4.6	12.0	.343	.878	.00507	-.00068	.00051
857	-9.2	-6.0	4.8	13.0	.343	.878	.00563	-.00080	.00057
858	-8.4	-6.3	4.8	13.5	.344	.879	.00624	-.00082	.00059
859	-5.0	-3.7	3.8	8.0	.345	.878	.00434	-.00017	.00033
860	-5.0	-5.3	4.4	10.0	.346	.878	.00557	-.00033	.00039
861	-5.0	-6.1	4.9	12.0	.346	.878	.00662	-.00050	.00047
862	-5.0	-7.6	5.2	14.0	.346	.878	.00768	-.00067	.00057
863	-11.8	-2.9	4.7	10.0	.390	.911	.00220	-.00012	.00034
864	-11.8	-4.1	5.1	12.0	.389	.911	.00330	-.00041	.00046
865	-11.8	-5.6	5.5	14.0	.390	.910	.00438	-.00070	.00058

Table 12. Rotor Performance Data for Advanced Stiff Blade Set
With $I_b = 0.6735 \text{ slug-ft}^3$

(a) $\rho = 0.006 \text{ slug/ft}^3$; $M_T = 0.628$; $\gamma = 9.55$

RUN	56	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1551	-5.0	1551	-1.0	2.8	4.1	.353	.882	.00221	.00005	.00019	
1552	-5.0	1552	-2.0	3.8	6.1	.352	.881	.00389	-.00011	.00025	
1553	-5.0	1553	-2.9	4.8	8.0	.354	.882	.00555	-.00028	.00033	
1554	-4.9	1554	-4.0	5.8	10.0	.354	.881	.00705	-.00044	.00044	
1555	-5.0	1555	-5.0	6.8	12.0	.353	.881	.00863	-.00060	.00057	
1556	-5.0	1556	-6.1	7.8	14.1	.354	.880	.01000	-.00078	.00077	
1557	-5.0	1557	-6.7	8.4	15.1	.353	.879	.01056	-.00088	.00089	
1558	-9.2	1558	-4.2	6.0	12.1	.352	.881	.00668	-.00087	.00063	
1559	-9.2	1559	-5.2	7.0	14.0	.351	.879	.00810	-.00114	.00080	
1560	-9.2	1560	-3.1	5.0	10.0	.351	.880	.00507	-.00056	.00048	
1561	-9.2	1561	-2.1	4.1	8.0	.350	.880	.00355	-.00028	.00035	
1562	-9.2	1562	-1.2	3.0	6.0	.349	.879	.00197	.00001	.00024	
1563	-9.2	1563	-2.4	4.1	8.0	.350	.852	.00353	-.00029	.00035	
1564	-9.2	1564	-3.3	5.0	10.0	.351	.852	.00510	-.00056	.00048	
1565	-9.2	1565	-4.2	6.1	12.1	.350	.852	.00667	-.00084	.00063	
1566	-9.2	1566	-5.2	7.0	14.1	.350	.852	.00818	-.00112	.00081	
1567	-9.2	1567	-5.8	7.5	15.1	.350	.851	.00883	-.00125	.00090	
1568	-5.0	1568	-5.1	6.8	12.0	.353	.852	.00858	-.00056	.00058	
1569	-5.0	1569	-6.2	7.8	14.1	.352	.851	.00995	-.00075	.00077	
1570	-5.0	1570	-4.0	5.8	10.0	.354	.852	.00711	-.00040	.00045	
1571	-5.0	1571	-3.1	4.7	8.0	.352	.852	.00554	-.00024	.00035	
1572	-5.0	1572	-2.1	3.7	6.0	.353	.852	.00390	-.00009	.00026	
1573	-6.2	1573	-2.3	3.3	6.1	.303	.820	.00396	-.00022	.00028	
1574	-6.2	1574	-3.2	4.1	8.1	.303	.820	.00561	-.00041	.00037	
1575	-6.2	1575	-4.0	5.0	10.0	.303	.820	.00719	-.00060	.00048	
1576	-6.2	1576	-5.0	5.9	12.0	.304	.821	.00876	-.00082	.00062	
1577	-6.2	1577	-6.0	6.8	14.1	.302	.819	.01024	-.00103	.00080	
1578	.0	1578	-5.1	5.7	10.0	.305	.820	.01007	.00009	.00036	
1579	.0	1579	-5.5	6.2	11.1	.305	.820	.01083	.00005	.00044	
1580	.0	1580	-4.1	4.7	8.1	.305	.820	.00857	.00014	.00026	
1581	.0	1581	-3.3	3.9	6.0	.305	.820	.00680	.00015	.00019	
1582	.0	1582	-2.4	2.9	4.1	.304	.820	.00511	.00018	.00014	
1583	.0	1583	-1.5	2.0	2.0	.305	.821	.00327	.00018	.00013	
1584	.0	1584	-2.2	.9	2.1	.153	.724	.00328	.00009	.00015	
1585	.0	1585	-2.9	1.3	4.1	.151	.723	.00508	.00009	.00020	
1586	.0	1586	-3.5	1.7	6.1	.151	.723	.00683	.00009	.00027	
1587	.0	1587	-4.3	2.1	8.0	.151	.723	.00850	.00008	.00036	
1588	.0	1588	-5.0	2.6	10.1	.152	.724	.01015	.00005	.00049	
1589	.0	1589	-5.7	3.2	12.1	.153	.725	.01168	.00000	.00064	
1590	-1.8	1590	-5.5	3.1	12.0	.152	.724	.01119	-.00034	.00066	
1591	-1.8	1591	-4.8	2.6	10.0	.152	.724	.00963	-.00026	.00050	
1592	-1.8	1592	-4.1	2.2	8.1	.151	.723	.00805	-.00018	.00038	
1593	-1.8	1593	-3.4	1.8	6.0	.153	.725	.00628	-.00012	.00028	
1594	-1.8	1594	-2.7	1.4	4.1	.153	.725	.00458	-.00006	.00021	
1595	-1.8	1595	-2.0	1.0	2.1	.154	.725	.00281	-.00001	.00016	

Table 12. Continued

(b) $\rho = 0.006 \text{ slug/ft}^3$; $M_T = 0.65$; $\gamma = 9.55$

RUN 55

POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
1499	.0	-2.4	.9	2.0	.151	.750	.00313	.00008	.00016
1500	.0	-2.7	1.6	4.0	.148	.750	.00490	.00008	.00020
1501	.0	-3.6	1.9	6.0	.146	.749	.00666	.00008	.00027
1502	.0	-4.4	2.2	8.0	.145	.746	.00850	.00007	.00037
1503	.0	-5.1	2.6	10.0	.150	.751	.01011	.00005	.00049
1504	.0	-5.9	3.2	12.0	.152	.752	.01173	.00000	.00066
1507	-1.8	-5.0	2.7	10.0	.153	.752	.00977	-.00026	.00053
1508	-1.8	-5.7	3.1	12.0	.152	.751	.01134	-.00035	.00069
1509	-1.8	-4.2	2.2	8.0	.151	.751	.00810	-.00018	.00040
1510	-1.8	-3.6	1.8	6.0	.152	.752	.00641	-.00012	.00030
1513	-1.8	-2.8	1.4	4.0	.154	.753	.00469	-.00004	.00022
1514	-1.8	-2.2	1.0	2.1	.156	.754	.00295	.00002	.00018
1515	-5.1	-1.7	1.1	2.1	.155	.753	.00216	-.00007	.00018
1516	-5.1	-2.3	1.4	4.0	.155	.752	.00389	-.00022	.00024
1517	-5.1	-2.9	1.8	6.0	.152	.751	.00560	-.00036	.00032
1518	-5.1	-3.6	2.2	7.9	.151	.750	.00730	-.00053	.00043
1519	-5.1	-4.4	2.7	10.0	.151	.750	.00894	-.00070	.00056
1520	-5.1	-5.2	3.1	12.0	.152	.750	.01052	-.00086	.00072
1521	-5.1	-5.5	3.3	12.9	.152	.750	.01125	-.00095	.00081
1522	.0	-1.6	2.0	2.0	.303	.849	.00333	.00021	.00014
1523	.0	-2.5	2.9	4.0	.303	.848	.00517	.00019	.00016
1524	.0	-3.4	3.9	6.0	.304	.849	.00699	.00015	.00020
1525	.0	-4.3	4.8	8.0	.304	.848	.00873	.00012	.00027
1526	.0	-5.1	5.7	10.0	.302	.848	.01029	.00007	.00038
1527	.0	-5.1	5.7	10.0	.303	.847	.01031	.00007	.00037
1528	.0	-5.6	6.2	11.0	.303	.846	.01102	.00002	.00045
1529	-6.2	-1.4	2.4	4.0	.300	.847	.00232	-.00006	.00020
1531	-6.2	-3.2	4.2	8.0	.302	.847	.00573	-.00047	.00037
1534	-6.2	-4.1	5.1	10.0	.301	.847	.00735	-.00068	.00049
1535	-6.2	-5.1	6.0	12.0	.302	.846	.00893	-.00089	.00063
1536	-6.2	-6.1	6.9	14.0	.301	.844	.01035	-.00110	.00081
1537	-8.0	-3.7	4.8	10.0	.301	.847	.00655	-.00078	.00050
1538	-8.0	-4.7	5.7	12.0	.301	.847	.00815	-.00103	.00065
1539	-8.0	-5.6	6.7	14.0	.300	.845	.00960	-.00128	.00083
1540	-8.0	-2.9	3.9	8.0	.300	.847	.00493	-.00052	.00038
1541	-8.0	-2.0	3.0	6.0	.300	.846	.00324	-.00026	.00027

Table 12. Continued

(c) $\rho = 0.009 \text{ slug/ft}^3$; $M_T = 0.628$; $\gamma = 14.32$

RUN	108									
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q	
3092	-5.0	-2.8	3.6	7.9	.346	.878	.00504	-.00020	.00029	
3093	-5.0	-4.0	4.3	9.9	.347	.878	.00637	-.00036	.00037	
3094	-5.0	-5.3	5.0	12.0	.347	.877	.00768	-.00053	.00048	
3095	-5.0	-5.6	5.1	12.5	.346	.875	.00804	-.00057	.00051	
3096	-5.0	-4.0	4.3	9.9	.347	.875	.00642	-.00035	.00038	
3097	-5.0	-2.8	3.6	7.9	.348	.876	.00509	-.00019	.00030	
3098	-9.2	-2.0	3.1	8.0	.343	.875	.00327	-.00024	.00031	
3099	-9.2	-3.2	3.7	9.9	.343	.875	.00456	-.00049	.00041	
3100	-9.2	-4.3	4.5	12.0	.344	.875	.00587	-.00075	.00053	
3101	-9.2	-5.0	4.7	13.0	.343	.874	.00652	-.00087	.00060	
3102	-9.2	-5.6	5.0	13.9	.344	.873	.00714	-.00101	.00067	
3103	-9.2	-3.1	3.7	9.9	.343	.874	.00458	-.00048	.00042	
3104	-9.2	-2.1	3.1	7.9	.344	.850	.00323	-.00022	.00031	
3105	-9.2	-3.2	3.8	9.9	.344	.850	.00457	-.00048	.00042	
3106	-9.2	-4.5	4.5	12.0	.344	.849	.00586	-.00074	.00054	
3107	-9.2	-5.7	5.0	13.9	.345	.849	.00716	-.00100	.00067	
3108	-5.0	-4.2	4.3	9.9	.346	.849	.00641	-.00034	.00038	
3109	-5.0	-5.4	5.0	11.9	.347	.850	.00769	-.00051	.00048	
3110	-5.0	-6.0	5.4	13.0	.347	.849	.00831	-.00059	.00054	
3111	-5.0	-6.7	5.6	13.9	.346	.849	.00889	-.00068	.00061	
3112	-5.0	-3.0	3.6	8.0	.347	.849	.00511	-.00019	.00030	
3113	-5.0	-1.8	2.8	6.0	.347	.849	.00370	-.00003	.00024	
3114	-6.2	-2.1	2.3	5.9	.297	.817	.00368	-.00018	.00025	
3115	-6.2	-3.1	2.9	8.0	.297	.818	.00514	-.00037	.00032	
3116	-6.2	-4.3	3.5	10.0	.296	.817	.00651	-.00056	.00041	
3117	-6.2	-5.3	4.1	12.0	.295	.817	.00787	-.00075	.00052	
3118	-6.2	-5.9	4.3	13.0	.297	.818	.00854	-.00085	.00058	
3119	.0	-5.3	4.0	9.9	.299	.818	.00913	.00009	.00028	
3120	.0	-4.4	3.4	8.0	.300	.818	.00775	.00012	.00020	
3121	.0	-3.2	2.7	6.0	.300	.818	.00632	.00016	.00015	
3122	.0	-2.1	2.0	4.0	.299	.818	.00483	.00019	.00012	
3123	.0	-1.0	1.3	2.0	.297	.817	.00328	.00022	.00012	
3124	-.1	-2.0	.1	2.0	.149	.723	.00317	.00009	.00015	
3125	-.1	-2.8	.3	4.0	.150	.724	.00473	.00008	.00018	
3126	-.1	-3.6	.5	6.0	.149	.724	.00627	.00007	.00023	
3128	-.1	-4.3	.7	8.0	.149	.724	.00774	.00006	.00030	
3129	-.1	-5.0	.9	9.9	.150	.724	.00921	.00004	.00040	
3130	-1.8	-4.9	1.0	9.9	.150	.724	.00873	-.00023	.00042	
3131	-1.8	-4.1	.7	8.0	.151	.725	.00729	-.00017	.00032	
3132	-1.8	-3.4	.5	6.0	.151	.725	.00584	-.00011	.00024	
3133	-1.8	-2.6	.3	3.9	.151	.725	.00432	-.00005	.00019	

Table 12. Concluded

(d) $\rho = 0.009 \text{ slug/ft}^3$; $M_T = 0.65$; $\gamma = 14.32$

RUN 107

POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
3051	-1.8	-3.3	.7	6.0	.150	.748	.00565	-.00011	.00025
3052	-1.8	-4.0	.7	8.0	.148	.748	.00720	-.00016	.00033
3053	-1.8	-4.4	.8	9.0	.149	.749	.00796	-.00019	.00037
3054	-1.8	-4.4	.8	9.0	.147	.747	.00801	-.00019	.00038
3055	-1.8	-4.1	.7	8.0	.149	.749	.00729	-.00016	.00033
3056	-1.8	-3.3	.5	6.0	.151	.750	.00583	-.00010	.00026
3057	-5.0	-3.0	.6	6.0	.151	.749	.00503	-.00035	.00028
3058	-5.0	-3.7	.7	8.0	.151	.749	.00651	-.00049	.00036
3059	-5.0	-4.4	.9	9.9	.149	.748	.00795	-.00064	.00046
3060	-5.0	-4.4	.9	9.9	.149	.748	.00793	-.00064	.00046
3061	-5.0	-3.7	.7	8.0	.150	.749	.00652	-.00048	.00036
3062	-5.0	-2.9	.5	6.0	.150	.749	.00504	-.00034	.00028
3063	-5.0	-2.9	.5	6.0	.149	.748	.00504	-.00034	.00028
3064	.0	-3.5	.5	6.0	.150	.749	.00628	.00009	.00025
3065	.0	-4.3	.7	8.0	.148	.747	.00775	.00008	.00032
3066	.0	-4.7	.8	9.0	.148	.747	.00851	.00007	.00036
3067	.0	-4.3	.7	8.0	.148	.747	.00775	.00007	.00032
3068	.0	-3.5	.5	6.0	.149	.748	.00629	.00009	.00024
3069	.0	-2.8	.3	4.0	.151	.749	.00474	.00008	.00019
3070	-6.2	-1.9	2.3	6.0	.296	.844	.00366	-.00019	.00025
3071	-6.2	-3.0	2.9	8.0	.297	.844	.00511	-.00038	.00032
3072	-6.2	-4.1	3.6	10.0	.296	.844	.00654	-.00058	.00042
3073	-6.2	-5.3	4.1	12.0	.296	.844	.00781	-.00078	.00052
3074	-6.2	-5.6	4.2	12.5	.297	.843	.00818	-.00083	.00055
3075	-6.2	-4.2	3.5	10.0	.298	.844	.00651	-.00059	.00042
3076	-6.2	-1.9	2.3	6.0	.297	.843	.00370	-.00020	.00025
3077	-8.0	-2.7	2.8	8.0	.296	.843	.00440	-.00044	.00034
3078	-8.0	-3.8	3.4	10.0	.296	.844	.00577	-.00067	.00043
3079	-8.0	-4.9	4.0	12.0	.296	.844	.00708	-.00090	.00055
3080	-8.0	-5.5	4.2	13.0	.295	.843	.00779	-.00103	.00061
3081	-8.0	-3.8	3.3	10.0	.296	.843	.00576	-.00067	.00043
3083	-8.0	-2.6	2.8	8.0	.297	.843	.00438	-.00044	.00033
3084	.0	-2.9	2.7	6.0	.298	.843	.00631	.00014	.00016
3085	.0	-4.1	3.4	8.0	.298	.843	.00774	.00008	.00021
3086	.0	-3.0	2.8	6.0	.300	.844	.00627	.00011	.00015
3087	.0	-2.0	2.0	4.0	.299	.845	.00473	.00015	.00012

Table 13. Rotor Performance Data for Advanced Elastic Blade Set
With $I_b = 0.6735 \text{ slug}\cdot\text{ft}^2$

(a) $\rho = 0.00382 \text{ slug}/\text{ft}^3$; $M_T = 0.65$; $\gamma = 6.08$

RUN	95	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2786	-1.8	-2.8	1.3	4.0	.149	.749	.00449	.00005	.00019		
2787	-1.8	-3.5	1.8	6.0	.149	.749	.00634	-.00012	.00026		
2788	-1.8	-4.2	2.3	8.0	.153	.751	.00815	-.00019	.00035		
2792	-1.8	-6.5	4.3	14.0	.149	.749	.01299	-.00047	.00092		
2793	.0	-6.8	4.4	14.0	.153	.751	.01343	-.00010	.00091		
2794	.0	-6.0	3.6	12.0	.148	.752	.01207	.00001	.00069		
2795	.0	-5.1	3.0	10.0	.154	.752	.01065	.00012	.00052		
2796	.0	-4.4	2.4	8.0	.154	.752	.00891	.00015	.00038		
2797	.0	-3.7	1.9	6.0	.154	.752	.00711	.00017	.00029		
2798	.0	-3.0	1.3	4.0	.153	.751	.00526	.00017	.00023		
2799	-5.0	-3.1	1.8	6.0	.154	.752	.00556	-.00030	.00033		
2800	-5.0	-3.8	2.3	8.0	.154	.752	.00735	-.00047	.00043		
2801	-5.0	-4.5	2.8	10.0	.150	.750	.00912	-.00065	.00057		
2802	-5.0	-5.2	3.4	12.0	.152	.751	.01075	-.00086	.00074		
2803	-5.0	-6.1	4.1	14.0	.149	.749	.01222	-.00108	.00095		
2804	-6.2	-3.2	4.2	8.0	.304	.851	.00567	-.00038	.00040		
2805	-6.2	-4.0	5.3	10.0	.304	.850	.00737	-.00060	.00051		
2806	-6.2	-5.0	6.4	12.0	.303	.850	.00883	-.00082	.00066		
2807	-6.2	-6.1	7.5	14.0	.303	.850	.01009	-.00109	.00088		
2808	-6.2	-7.3	8.8	16.0	.303	.849	.01116	-.00138	.00118		
2809	-8.0	-6.8	8.4	16.0	.304	.849	.01063	-.00156	.00116		
2810	-8.0	-5.6	7.2	14.0	.302	.849	.00947	-.00125	.00087		
2811	-8.0	-4.7	6.2	12.0	.304	.850	.00804	-.00098	.00067		
2812	-8.0	-3.7	5.0	10.0	.304	.850	.00646	-.00070	.00051		
2813	-8.0	-2.8	4.1	8.0	.305	.851	.00483	-.00043	.00039		
2816	.0	-4.1	5.0	8.0	.306	.850	.00862	.00012	.00027		
2817	.0	-5.1	6.2	10.0	.307	.850	.01004	.00001	.00041		
2818	.0	-6.1	7.3	12.0	.307	.850	.01137	-.00016	.00061		
2819	.0	-7.3	8.6	14.0	.307	.850	.01241	-.00039	.00089		
2820	-9.2	-5.0	7.6	14.0	.354	.884	.00803	-.00118	.00079		
2821	-9.2	-6.2	8.8	16.0	.353	.883	.00935	-.00149	.00106		
2822	-9.2	-4.1	6.5	12.0	.352	.883	.00657	-.00088	.00061		
2823	-9.2	-3.2	5.3	10.0	.350	.881	.00501	-.00059	.00046		
2824	-5.0	-4.0	6.1	10.0	.355	.882	.00711	-.00044	.00043		
2825	-5.0	-4.9	7.3	12.0	.355	.882	.00854	-.00064	.00058		
2826	-5.0	-6.0	8.7	14.0	.355	.882	.00974	-.00087	.00081		
2827	-5.0	-7.3	9.9	16.0	.355	.881	.01073	-.00116	.00111		
2828	-5.0	-3.1	4.8	8.0	.355	.881	.00554	-.00030	.00031		

Table 13. Continued

(b) $\rho = 0.006 \text{ slug/ft}^3$; $M_T = 0.628$; $\gamma = 9.55$

RUN	90	HOVER			
POINT	A ₁	B ₁	θ	C _T	C _Q
2677	.1	.1	5.9	.00311	.00024
2678	.0	.0	7.9	.00445	.00033
2679	.0	.0	9.8	.00581	.00045
2680	.0	.0	11.4	.00692	.00055
2681	.0	.0	11.6	.00709	.00057
2682	.1	.1	12.8	.00797	.00067
2683	.0	.0	13.9	.00872	.00076
2684	.0	.0	14.0	.00894	.00078
2685	.0	.0	15.0	.00965	.00089
2686	.0	.0	16.1	.01037	.00100
2687	.1	.1	13.9	.00886	.00077
2688	.0	.1	11.4	.00697	.00055

Table 13. Continued

(b) Continued

RUN	74	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2111	.0	-1.3	1.1	2.0	.152	.726	.00252	.00009	.00013		
2112	.0	-2.6	1.1	4.1	.150	.724	.00435	.00008	.00016		
2113	.0	-2.7	1.8	6.0	.150	.724	.00603	.00006	.00022		
2114	.0	-3.3	2.2	8.0	.149	.722	.00775	.00006	.00030		
2115	.0	-4.6	2.1	10.0	.151	.724	.00936	.00004	.00040		
2116	.1	-5.2	2.6	12.1	.149	.723	.01102	.00001	.00054		
2117	.1	-5.7	2.7	13.0	.152	.725	.01173	-.00001	.00062		
2118	-1.8	-4.3	2.3	10.0	.152	.725	.00901	-.00023	.00043		
2119	-1.8	-5.1	2.5	12.0	.151	.724	.01056	-.00032	.00056		
2120	-1.8	-5.5	2.7	13.0	.152	.725	.01128	-.00037	.00065		
2121	-1.8	-3.7	1.9	8.0	.153	.726	.00745	-.00017	.00032		
2122	-1.8	-3.0	1.6	6.0	.156	.727	.00577	-.00011	.00024		
2123	-1.8	-2.3	1.2	4.1	.154	.727	.00414	-.00005	.00018		
2124	-1.8	-1.6	.9	2.0	.154	.727	.00240	.00002	.00015		
2125	.1	-.3	2.0	2.1	.304	.821	.00273	.00022	.00011		
2126	.1	-1.3	2.8	4.1	.305	.821	.00448	.00020	.00012		
2127	.1	-2.2	3.7	6.0	.305	.821	.00617	.00016	.00015		
2128	.1	-3.2	4.6	8.0	.306	.822	.00778	.00010	.00020		
2129	.1	-4.2	5.4	10.0	.304	.821	.00926	.00002	.00030		
2130	.1	-5.3	6.2	12.0	.305	.821	.01061	-.00010	.00044		
2131	-6.2	-1.5	3.0	6.0	.303	.820	.00343	-.00017	.00023		
2133	-6.2	-3.4	4.6	10.0	.304	.821	.00658	-.00059	.00040		
2134	-6.2	-4.3	5.4	12.0	.303	.820	.00808	-.00080	.00052		
2135	-6.2	-5.4	6.2	14.0	.302	.820	.00949	-.00103	.00069		
2136	-6.2	-6.7	6.9	16.0	.303	.819	.01065	-.00128	.00090		
2137	-5.0	-1.9	4.6	8.0	.353	.852	.00493	-.00020	.00028		
2138	-5.0	-2.9	5.5	10.0	.353	.852	.00644	-.00038	.00036		
2139	-5.0	-4.1	6.3	12.0	.354	.851	.00784	-.00057	.00048		
2140	-5.0	-5.2	7.2	14.0	.354	.852	.00916	-.00077	.00064		
2141	-5.0	-6.5	8.0	16.0	.355	.852	.01030	-.00099	.00086		
2142	-5.0	-.9	3.6	6.0	.352	.850	.00339	-.00003	.00020		
2143	-9.2	-1.2	3.9	8.0	.348	.850	.00300	-.00021	.00028		
2145	-9.2	-2.3	4.8	10.0	.350	.851	.00449	-.00050	.00039		
2146	-9.2	-3.2	5.7	12.0	.352	.851	.00596	-.00077	.00052		
2147	-9.2	-4.4	6.5	14.0	.352	.851	.00739	-.00106	.00068		
2148	-9.2	-4.9	6.8	15.0	.351	.851	.00809	-.00120	.00076		
2149	-9.2	-5.6	7.2	16.0	.351	.851	.00874	-.00136	.00087		
2150	-9.1	-2.0	4.6	10.0	.350	.882	.00453	-.00049	.00039		
2151	-9.2	-3.1	5.6	12.0	.350	.883	.00594	-.00077	.00052		
2152	-9.2	-4.2	6.4	14.0	.349	.882	.00745	-.00106	.00067		
2153	-9.2	-4.8	6.8	15.0	.351	.882	.00813	-.00122	.00077		
2154	-5.0	-1.6	4.5	8.0	.353	.882	.00489	-.00019	.00027		
2155	-5.0	-2.7	5.5	10.0	.353	.882	.00641	-.00038	.00036		
2156	-5.0	-3.8	6.3	12.0	.353	.882	.00785	-.00057	.00048		
2157	-5.0	-4.9	7.2	14.0	.353	.882	.00915	-.00077	.00064		
2158	-5.0	-5.6	7.6	15.0	.353	.882	.00972	-.00088	.00075		
2159	-9.2	-5.4	7.2	16.0	.350	.882	.00874	-.00136	.00087		

Table 13. Continued

(b) Continued

RUN	81	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2306	-1.9	-3.8	1.7	7.7	.150	.724	.00695	-.00017	.00028		
2307	-1.7	-3.8	1.7	7.8	.149	.722	.00713	-.00016	.00029		
2308	-1.7	-3.8	1.7	7.8	.150	.723	.00711	-.00016	.00029		
2309	-1.6	-4.3	1.9	8.8	.150	.723	.00795	-.00018	.00034		
2310	-1.6	-4.2	1.9	8.8	.149	.723	.00794	-.00018	.00034		
2311	-1.3	-4.6	2.0	9.7	.149	.722	.00878	-.00016	.00039		
2312	-1.3	-4.6	2.0	9.7	.150	.723	.00875	-.00016	.00038		
2313	-1.3	-4.7	2.0	9.9	.151	.724	.00891	-.00017	.00040		
2314	-1.3	-4.7	2.0	9.9	.152	.723	.00894	-.00017	.00040		
2315	-3.2	-4.7	2.1	10.5	.150	.723	.00887	-.00046	.00045		
2316	-3.2	-4.7	2.1	10.5	.151	.724	.00886	-.00047	.00045		
2317	-1.1	-5.1	2.2	10.8	.151	.724	.00966	-.00017	.00045		
2318	-1.1	-5.1	2.2	10.8	.149	.723	.00966	-.00016	.00045		
2319	-1.0	-5.5	2.4	11.9	.150	.722	.01051	-.00017	.00053		
2320	-1.0	-5.5	2.4	11.9	.149	.722	.01051	-.00017	.00053		
2321	-2.6	-5.3	2.4	12.2	.150	.723	.01033	-.00046	.00057		
2322	-2.6	-5.3	2.4	12.2	.151	.723	.01031	-.00047	.00057		
2323	-1.0	-5.6	2.4	12.2	.150	.723	.01076	-.00019	.00055		
2324	-1.0	-5.6	2.4	12.2	.150	.723	.01074	-.00019	.00055		
2325	-.8	-6.0	2.6	13.2	.150	.723	.01145	-.00019	.00063		
2326	-.8	-6.0	2.6	13.2	.149	.722	.01145	-.00019	.00063		

Table 13. Continued

(b) Continued

RUN	82	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2330	-2.5	-3.7	2.6	7.9	.203	.757	.00700	-.00025	.00027		
2331	-2.5	-3.7	2.6	8.0	.204	.758	.00708	-.00025	.00027		
2332	-2.5	-3.8	2.7	8.2	.202	.757	.00726	-.00026	.00028		
2333	-2.5	-3.8	2.7	8.3	.203	.757	.00728	-.00026	.00028		
2334	-2.2	-4.2	2.9	9.0	.203	.757	.00809	-.00026	.00032		
2335	-2.2	-4.2	2.8	9.1	.203	.757	.00809	-.00026	.00031		
2336	-1.8	-4.7	3.2	10.1	.201	.755	.00909	-.00026	.00037		
2337	-1.8	-4.7	3.2	10.2	.203	.756	.00911	-.00026	.00037		
2338	-1.8	-4.8	3.2	10.3	.203	.756	.00922	-.00027	.00037		
2339	-1.8	-4.8	3.2	10.3	.201	.755	.00923	-.00027	.00038		
2340	-5.1	-5.0	3.4	11.7	.202	.756	.00921	-.00079	.00051		
2341	-5.1	-4.9	3.4	11.7	.201	.756	.00924	-.00078	.00051		
2342	-1.6	-5.1	3.4	11.0	.202	.756	.00984	-.00026	.00041		
2345	-1.6	-5.1	3.4	11.0	.202	.756	.00986	-.00026	.00042		
2346	-1.5	-5.2	3.5	11.2	.202	.756	.01004	-.00026	.00043		
2347	-1.5	-5.2	3.5	11.2	.204	.757	.01004	-.00026	.00043		
2348	-4.4	-5.4	3.7	12.5	.202	.756	.01003	-.00076	.00056		
2349	-4.5	-5.4	3.7	12.5	.203	.757	.01001	-.00077	.00056		
2350	-1.5	-5.3	3.5	11.4	.203	.757	.01018	-.00026	.00044		
2351	-1.5	-5.3	3.5	11.4	.202	.756	.01020	-.00025	.00044		
2352	-1.2	-5.8	3.8	12.4	.201	.756	.01109	-.00026	.00051		
2356	-1.8	-6.0	5.3	13.2	.254	.789	.01110	-.00040	.00054		
2358	-2.3	-5.4	4.8	12.0	.253	.788	.01013	-.00040	.00046		
2359	-6.7	-5.9	5.2	14.3	.252	.789	.01013	-.00120	.00072		
2360	-6.7	-5.9	5.2	14.3	.253	.789	.01010	-.00120	.00072		
2361	-2.3	-5.3	4.8	12.0	.253	.788	.01009	-.00039	.00045		
2362	-2.3	-5.3	4.8	12.0	.254	.789	.01009	-.00039	.00045		
2363	-2.4	-5.2	4.8	11.9	.252	.787	.00996	-.00039	.00045		
2364	-2.4	-5.2	4.8	11.9	.254	.789	.00996	-.00039	.00045		

Table 13. Continued

(b) Continued

RUN	83	POINT	α_S	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2368	-4.0	-3.7	3.6	8.8	.252	.789	.00703	-.00041	.00032		
2369	-4.0	-3.7	3.6	8.8	.252	.789	.00707	-.00040	.00032		
2370	-3.9	-3.8	3.7	9.0	.252	.788	.00727	-.00041	.00033		
2371	-3.9	-3.8	3.7	9.0	.253	.788	.00727	-.00040	.00033		
2372	-3.4	-4.3	4.0	9.8	.253	.789	.00817	-.00041	.00037		
2373	-3.4	-4.2	4.0	9.8	.253	.789	.00817	-.00041	.00037		
2374	-3.0	-4.7	4.4	10.8	.252	.788	.00901	-.00043	.00041		
2375	-3.0	-4.7	4.4	10.8	.254	.789	.00901	-.00042	.00041		
2376	-2.9	-4.7	4.5	10.9	.253	.788	.00914	-.00041	.00041		
2377	-2.9	-4.7	4.5	10.9	.254	.789	.00914	-.00041	.00042		
2378	-8.0	-5.1	4.9	13.4	.251	.789	.00910	-.00123	.00067		
2379	-8.0	-5.1	4.9	13.4	.251	.788	.00910	-.00123	.00067		
2381	-5.0	-3.8	4.5	9.9	.282	.806	.00729	-.00051	.00039		
2382	-5.0	-3.9	4.5	8.0	.283	.808	.00519	-.00041	.00031		
2383	-5.0	-3.9	4.5	9.0	.282	.807	.00623	-.00047	.00035		
2384	-5.0	-3.9	4.5	10.0	.281	.807	.00731	-.00052	.00039		
2385	-5.0	-3.8	4.5	11.0	.281	.807	.00840	-.00054	.00044		
2386	-5.0	-3.8	4.5	12.0	.280	.806	.00942	-.00054	.00049		
2387	-5.0	-5.8	4.5	9.9	.282	.807	.00665	-.00064	.00041		
2388	-5.0	-4.8	4.5	9.9	.281	.807	.00700	-.00058	.00040		
2389	-5.0	-3.8	4.4	10.0	.281	.807	.00731	-.00052	.00039		
2390	-5.0	-2.8	4.5	9.9	.283	.808	.00759	-.00045	.00038		
2391	-5.0	-1.8	4.5	9.9	.280	.808	.00790	-.00037	.00036		
2392	-5.0	-3.8	2.5	10.0	.281	.807	.00802	-.00039	.00037		
2393	-5.0	-3.9	3.5	9.9	.281	.807	.00757	-.00047	.00037		
2394	-5.0	-3.8	4.5	9.9	.281	.807	.00724	-.00052	.00039		
2395	-5.0	-3.8	5.5	9.9	.283	.808	.00691	-.00058	.00040		
2396	-5.0	-3.8	6.4	9.9	.280	.806	.00658	-.00062	.00041		
2398	-4.1	-4.3	4.9	10.7	.282	.806	.00816	-.00051	.00041		
2399	-4.1	-4.3	4.9	10.7	.282	.806	.00818	-.00051	.00041		
2400	-4.2	-4.3	4.9	8.6	.283	.807	.00607	-.00045	.00033		
2401	-4.1	-4.2	4.9	9.7	.283	.807	.00714	-.00049	.00037		
2402	-4.1	-4.2	4.9	10.7	.282	.806	.00816	-.00051	.00041		
2403	-4.1	-4.2	4.9	11.7	.283	.807	.00923	-.00052	.00046		
2404	-4.1	-4.2	4.9	12.7	.282	.806	.01022	-.00050	.00053		
2405	-4.2	-6.3	4.9	10.7	.282	.806	.00757	-.00067	.00044		
2406	-4.1	-5.3	4.9	10.7	.281	.806	.00791	-.00060	.00043		
2407	-4.1	-4.2	4.9	10.8	.283	.807	.00829	-.00052	.00041		
2408	-4.1	-3.3	4.9	10.7	.281	.807	.00851	-.00044	.00040		
2409	-4.1	-2.3	4.9	10.7	.281	.806	.00882	-.00035	.00038		
2410	-4.1	-4.3	2.9	10.7	.282	.806	.00890	-.00036	.00038		
2411	-4.1	-4.3	3.9	10.6	.283	.807	.00846	-.00045	.00040		
2412	-4.1	-4.3	4.9	10.7	.283	.807	.00817	-.00053	.00041		
2413	-4.1	-4.3	5.9	10.7	.282	.806	.00786	-.00059	.00042		
2414	-4.1	-4.3	6.9	10.7	.283	.807	.00749	-.00066	.00043		
2415	-3.9	-1.3	7.1	7.3	.284	.808	.00486	-.00032	.00027		
2416	-3.5	-4.7	5.3	11.5	.283	.807	.00904	-.00053	.00045		

Table 13. Continued

(b) Continued

RUN	83								
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2417	-3.5	-4.7	5.3	11.5	.283	.807	.00904	-.00053	.00045
2418	-3.5	-4.7	5.3	9.4	.285	.808	.00689	-.00050	.00036
2419	-3.5	-4.7	5.3	10.5	.283	.807	.00798	-.00052	.00040
2420	-3.5	-4.7	5.3	11.5	.282	.806	.00898	-.00053	.00045
2421	-3.5	-4.7	5.3	12.5	.282	.806	.01001	-.00052	.00051
2422	-3.5	-4.7	5.3	13.5	.282	.806	.01092	-.00050	.00058
2423	-3.6	-6.7	5.3	11.5	.283	.807	.00839	-.00072	.00048
2424	-3.5	-5.7	5.3	11.5	.283	.807	.00870	-.00063	.00046
2425	-3.5	-4.7	5.3	11.5	.283	.807	.00906	-.00053	.00045
2426	-3.5	-3.7	5.3	11.5	.283	.807	.00934	-.00044	.00043
2427	-3.5	-2.8	5.3	11.5	.282	.806	.00962	-.00034	.00042
2428	-3.5	-4.7	3.3	11.5	.283	.807	.00972	-.00036	.00042
2429	-3.5	-4.7	4.3	11.5	.283	.807	.00936	-.00045	.00043
2430	-3.5	-4.7	5.3	11.5	.283	.807	.00897	-.00054	.00045
2431	-3.5	-4.7	6.3	11.5	.283	.807	.00861	-.00062	.00046
2432	-3.6	-4.7	7.3	11.4	.283	.807	.00825	-.00070	.00047

Table 13. Continued

(b) Continued

RUN 84

POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2438	-2.2	-4.2	2.8	8.9	.199	.755	.00822	-.00024	.00033
2439	-3.4	-4.3	4.0	9.8	.250	.786	.00825	-.00039	.00037
2440	-4.3	-4.3	4.8	10.7	.280	.805	.00818	-.00050	.00042
2441	-3.1	-5.5	5.5	12.3	.279	.804	.00983	-.00052	.00053
2442	-3.1	-5.5	5.6	12.3	.279	.803	.00984	-.00052	.00053
2443	-3.1	-5.6	5.6	10.4	.280	.804	.00775	-.00051	.00042
2444	-3.1	-5.6	5.6	11.4	.280	.804	.00885	-.00052	.00047
2445	-3.1	-5.5	5.6	12.4	.280	.804	.00980	-.00052	.00053
2446	-3.1	-5.6	5.5	13.4	.279	.803	.01073	-.00049	.00060
2447	-3.1	-5.5	5.6	14.4	.280	.804	.01158	-.00046	.00069
2448	-3.1	-7.6	5.5	12.3	.280	.804	.00915	-.00072	.00055
2449	-3.1	-6.6	5.6	12.3	.281	.804	.00948	-.00062	.00054
2450	-3.1	-5.5	5.6	12.3	.281	.804	.00981	-.00052	.00053
2451	-3.1	-4.6	5.6	12.4	.281	.804	.01012	-.00041	.00052
2452	-3.1	-3.6	5.6	12.4	.280	.804	.01041	-.00030	.00051
2453	-3.1	-5.6	3.6	12.4	.281	.804	.01049	-.00032	.00050
2454	-3.1	-5.6	4.6	12.4	.280	.804	.01012	-.00043	.00051
2455	-3.1	-5.6	5.6	12.3	.280	.804	.00976	-.00052	.00052
2456	-3.1	-5.6	6.6	12.3	.280	.804	.00941	-.00061	.00053
2457	-3.1	-5.6	7.5	12.3	.280	.804	.00911	-.00070	.00055
2458	-2.6	-6.2	6.0	13.5	.280	.804	.01069	-.00056	.00061
2459	-2.6	-6.2	6.0	13.5	.279	.803	.01069	-.00056	.00061
2460	-2.6	-6.2	6.1	11.4	.281	.804	.00875	-.00057	.00047
2461	-2.6	-6.2	6.1	12.5	.280	.803	.00975	-.00057	.00053
2462	-2.6	-6.2	6.0	13.4	.280	.802	.01068	-.00056	.00061
2465	-2.6	-6.1	6.1	14.4	.280	.803	.01151	-.00053	.00070
2466	-2.6	-6.2	6.0	15.5	.280	.803	.01235	-.00049	.00081
2467	-2.6	-8.4	6.3	13.4	.279	.805	.00991	-.00085	.00064
2468	-2.6	-7.2	6.0	13.4	.280	.805	.01038	-.00069	.00062
2469	-2.6	-6.2	6.0	13.5	.279	.805	.01068	-.00057	.00061
2470	-2.6	-5.2	6.1	13.5	.279	.805	.01097	-.00045	.00060
2471	-2.6	-4.3	6.0	13.5	.279	.805	.01122	-.00032	.00059
2472	-2.6	-6.2	4.1	13.5	.278	.804	.01131	-.00035	.00058
2473	-2.6	-6.2	5.1	13.4	.278	.804	.01095	-.00047	.00059
2474	-2.6	-6.3	6.0	13.4	.279	.805	.01061	-.00058	.00060
2475	-2.6	-6.2	7.0	13.4	.279	.804	.01030	-.00068	.00061
2476	-2.6	-6.2	8.0	13.3	.279	.805	.00998	-.00079	.00062
2477	-1.7	-6.9	6.5	14.4	.281	.806	.01152	-.00054	.00068
2478	-1.7	-6.9	6.5	14.4	.280	.805	.01151	-.00054	.00068

Table 13. Continued

(b) Continued

RUN 85

POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2482	-2.2	-6.1	5.9	13.2	.280	.806	.01068	-.00052	.00056
2483	-2.2	-6.1	6.0	13.2	.279	.805	.01068	-.00052	.00056
2488	-5.6	-4.0	4.9	10.5	.300	.819	.00703	-.00060	.00039
2489	-5.6	-4.0	4.9	10.5	.301	.819	.00703	-.00060	.00039
2491	-5.1	-4.1	4.9	10.4	.301	.818	.00728	-.00056	.00038
2492	-5.1	-4.1	4.9	10.4	.302	.819	.00728	-.00056	.00038
2493	-4.3	-4.5	5.3	11.1	.302	.819	.00814	-.00056	.00041
2494	-4.3	-4.5	5.3	11.1	.301	.818	.00814	-.00055	.00041
2495	-3.6	-5.1	5.7	11.9	.300	.818	.00897	-.00056	.00046
2496	-3.6	-5.1	5.7	11.9	.301	.818	.00897	-.00057	.00046
2497	-3.4	-5.2	5.8	12.1	.301	.818	.00912	-.00056	.00046
2499	-3.4	-5.2	5.8	12.1	.302	.819	.00913	-.00057	.00046
2500	-10.9	-5.9	6.3	16.0	.297	.819	.00889	-.00174	.00089
2501	-10.9	-5.9	6.3	16.0	.298	.819	.00886	-.00173	.00088
2502	-2.9	-5.8	6.2	12.8	.302	.819	.00981	-.00058	.00053
2503	-2.9	-5.8	6.2	12.8	.303	.819	.00980	-.00058	.00053
2504	-2.4	-6.2	6.5	13.6	.302	.818	.01044	-.00059	.00059
2505	-2.4	-6.2	6.5	13.6	.302	.818	.01044	-.00058	.00058
2507	-9.6	-6.9	6.8	17.0	.299	.818	.00986	-.00174	.00102
2508	-2.5	-6.4	6.7	13.9	.301	.817	.01062	-.00060	.00063
2509	-2.5	-6.4	6.7	13.9	.301	.817	.01062	-.00060	.00063
2510	-1.7	-7.2	7.2	15.0	.302	.818	.01151	-.00060	.00075
2511	-1.7	-7.2	7.2	15.0	.301	.817	.01150	-.00061	.00074

RUN 86

POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2520	-3.9	-5.1	5.7	12.1	.300	.818	.00896	-.00060	.00048
2522	-7.7	-4.4	6.2	12.6	.349	.849	.00696	-.00081	.00055
2523	-7.7	-4.5	6.2	10.6	.347	.851	.00478	-.00060	.00042
2524	-7.7	-4.5	6.2	11.6	.348	.850	.00582	-.00071	.00049
2525	-7.7	-4.4	6.2	12.6	.348	.847	.00691	-.00080	.00055
2526	-7.7	-4.4	6.2	13.6	.349	.847	.00795	-.00086	.00062
2527	-7.7	-4.5	6.2	14.6	.348	.849	.00897	-.00091	.00070
2528	-7.7	-6.4	6.2	12.6	.347	.848	.00618	-.00089	.00056
2529	-7.7	-5.4	6.2	12.7	.348	.848	.00662	-.00086	.00056
2530	-7.7	-4.4	6.3	12.7	.349	.848	.00694	-.00080	.00056
2531	-7.7	-3.4	6.2	12.7	.348	.848	.00732	-.00074	.00055
2532	-7.7	-2.5	6.2	12.7	.348	.848	.00770	-.00068	.00053
2534	-7.7	-4.4	4.3	12.6	.349	.848	.00770	-.00072	.00053
2535	-7.7	-4.4	5.2	12.6	.349	.849	.00728	-.00076	.00054
2536	-7.7	-4.5	6.2	12.6	.349	.848	.00687	-.00081	.00055
2537	-7.7	-4.5	7.2	12.6	.348	.848	.00656	-.00086	.00056
2538	-7.7	-4.4	8.2	12.6	.348	.848	.00618	-.00088	.00056

Table 13. Continued

(b) Continued

RUN	87	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2542	-7.5	-4.4	6.2	12.6	.350	.850	.00705	-.00079	.00054		
2544	-7.5	-4.4	6.2	10.6	.347	.848	.00494	-.00059	.00042		
2545	-7.5	-4.4	6.2	11.6	.349	.848	.00599	-.00070	.00048		
2546	-7.4	-4.4	6.2	12.6	.349	.849	.00705	-.00078	.00054		
2547	-7.4	-4.4	6.2	13.6	.350	.849	.00813	-.00084	.00061		
2548	-7.4	-4.4	6.2	14.6	.350	.849	.00914	-.00088	.00069		
2549	-7.5	-6.4	6.2	12.6	.350	.849	.00635	-.00089	.00056		
2550	-7.5	-5.4	6.2	12.6	.349	.848	.00678	-.00084	.00056		
2551	-7.5	-4.4	6.3	12.7	.348	.848	.00710	-.00078	.00055		
2552	-7.4	-3.4	6.2	12.6	.348	.848	.00745	-.00072	.00054		
2553	-7.4	-2.5	6.2	12.6	.349	.848	.00781	-.00066	.00053		
2554	-7.4	-4.4	4.3	12.6	.348	.848	.00791	-.00069	.00053		
2555	-7.4	-4.4	5.2	12.6	.349	.848	.00747	-.00074	.00054		
2556	-7.4	-4.4	6.2	12.6	.349	.848	.00704	-.00078	.00055		
2557	-7.5	-4.4	7.2	12.5	.350	.848	.00663	-.00082	.00055		
2558	-7.5	-4.4	8.2	12.6	.349	.848	.00623	-.00085	.00056		
2559	-6.7	-5.1	6.7	13.4	.349	.847	.00792	-.00082	.00060		
2560	-6.7	-5.1	6.7	11.4	.348	.847	.00575	-.00067	.00048		
2561	-6.7	-5.1	6.7	12.4	.349	.848	.00688	-.00077	.00054		
2562	-6.7	-5.1	6.7	13.4	.349	.848	.00791	-.00083	.00060		
2563	-6.7	-5.0	6.7	14.4	.349	.848	.00893	-.00087	.00068		
2564	-6.7	-5.1	6.6	15.4	.350	.847	.00988	-.00089	.00078		
2565	-6.7	-7.1	6.7	13.4	.350	.847	.00724	-.00098	.00063		
2566	-6.7	-6.1	6.6	13.5	.350	.847	.00763	-.00092	.00062		
2567	-6.7	-5.1	6.6	13.4	.350	.847	.00799	-.00084	.00061		
2568	-6.7	-4.2	6.5	13.4	.350	.847	.00835	-.00077	.00060		
2569	-6.7	-3.1	6.7	13.5	.350	.847	.00871	-.00069	.00059		
2570	-6.7	-5.1	4.7	13.5	.350	.847	.00880	-.00072	.00059		
2572	-6.7	-5.1	5.6	13.4	.350	.847	.00838	-.00079	.00059		
2573	-6.7	-5.1	6.6	13.4	.349	.846	.00795	-.00085	.00060		
2574	-6.7	-5.1	7.6	13.4	.349	.846	.00759	-.00090	.00061		
2575	-6.7	-5.1	8.6	13.4	.349	.845	.00721	-.00095	.00062		
2576	-5.8	-5.5	7.1	14.1	.349	.846	.00885	-.00084	.00065		
2577	-5.8	-5.5	7.1	12.1	.350	.846	.00678	-.00073	.00051		
2578	-5.8	-5.5	7.2	13.1	.349	.845	.00786	-.00080	.00057		
2579	-5.7	-5.5	7.1	14.1	.349	.845	.00884	-.00084	.00065		
2580	-5.7	-5.5	7.1	15.1	.349	.845	.00979	-.00085	.00075		
2581	-5.8	-7.6	7.2	14.1	.349	.845	.00812	-.00102	.00067		
2582	-5.8	-6.5	7.2	14.1	.349	.845	.00851	-.00093	.00066		
2583	-5.7	-5.6	7.2	14.1	.349	.845	.00885	-.00085	.00065		
2584	-5.7	-4.5	7.2	14.2	.350	.847	.00922	-.00076	.00065		
2587	-5.7	-5.6	5.2	14.1	.350	.848	.00959	-.00070	.00064		
2588	-5.7	-5.6	6.2	14.1	.352	.848	.00919	-.00078	.00064		
2589	-5.8	-5.6	7.2	14.1	.351	.848	.00880	-.00084	.00065		
2590	-5.8	-5.6	8.2	14.1	.352	.848	.00839	-.00090	.00066		
2591	-5.8	-5.6	9.2	14.1	.353	.848	.00806	-.00098	.00067		

Table 13. Continued

(b) Continued

RUN 88

POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2596	-5.1	-5.8	7.4	14.3	.351	.850	.00912	-.00080	.00068
2597	-5.1	-5.8	7.4	14.3	.352	.849	.00913	-.00080	.00068
2598	-5.1	-5.8	7.4	12.3	.352	.850	.00706	-.00071	.00054
2599	-5.1	-5.8	7.4	13.3	.351	.849	.00814	-.00076	.00060
2600	-5.1	-5.8	7.4	14.3	.350	.849	.00914	-.00078	.00068
2601	-5.1	-5.8	7.4	15.3	.351	.849	.01007	-.00079	.00078
2602	-5.1	-5.8	7.3	16.3	.352	.849	.01095	-.00078	.00091
2603	-5.1	-7.8	7.4	14.3	.351	.849	.00843	-.00097	.00071
2604	-5.1	-6.8	7.4	14.3	.352	.849	.00879	-.00087	.00070
2605	-5.1	-5.8	7.4	14.3	.352	.849	.00911	-.00078	.00069
2608	-5.1	-4.8	7.4	14.4	.352	.848	.00950	-.00068	.00069
2609	-5.1	-3.9	7.4	14.4	.353	.846	.00992	-.00059	.00069
2610	-5.1	-5.8	5.4	14.3	.351	.848	.00989	-.00063	.00068
2611	-5.1	-5.8	6.4	14.4	.352	.848	.00953	-.00071	.00069
2612	-5.1	-5.8	7.4	14.3	.352	.848	.00911	-.00078	.00069
2613	-5.1	-5.8	8.4	14.3	.351	.848	.00872	-.00084	.00070
2614	-5.1	-5.9	9.4	14.3	.351	.848	.00839	-.00092	.00071
2615	-5.3	-1.4	9.3	10.0	.351	.848	.00519	-.00041	.00041
2616	-4.4	-6.4	7.8	15.0	.352	.850	.00988	-.00080	.00076
2617	-4.4	-6.4	7.8	15.0	.352	.850	.00986	-.00079	.00076
2619	-3.7	-7.1	8.2	15.7	.353	.849	.01050	-.00080	.00086
2620	-3.8	-7.1	8.2	15.7	.352	.849	.01044	-.00080	.00085
2621	-3.6	-7.3	8.3	15.9	.352	.849	.01063	-.00081	.00088
2623	-8.8	-4.9	6.9	14.4	.373	.865	.00729	-.00094	.00071
2624	-8.8	-4.9	6.9	14.4	.374	.864	.00732	-.00094	.00071
2625	-8.8	-5.0	6.9	12.4	.372	.865	.00520	-.00070	.00055
2626	-8.8	-4.9	6.9	13.4	.373	.865	.00625	-.00084	.00063
2627	-8.8	-4.8	6.9	14.4	.373	.865	.00730	-.00094	.00071
2628	-8.8	-4.9	7.0	15.4	.372	.865	.00836	-.00102	.00079
2629	-8.8	-4.7	7.0	16.4	.372	.865	.00935	-.00106	.00089
2630	-8.8	-6.9	6.9	14.4	.373	.864	.00649	-.00104	.00071
2631	-8.8	-5.9	6.9	14.4	.372	.864	.00688	-.00101	.00071
2632	-8.8	-4.9	6.9	14.4	.372	.864	.00726	-.00096	.00070
2633	-8.8	-3.9	6.9	14.4	.372	.864	.00769	-.00090	.00069
2634	-8.8	-2.9	6.9	14.4	.372	.864	.00806	-.00084	.00069
2635	-8.8	-4.9	4.9	14.4	.372	.864	.00813	-.00089	.00069
2636	-8.8	-4.9	5.9	14.4	.373	.865	.00768	-.00093	.00069
2637	-8.8	-4.9	6.9	14.4	.372	.864	.00727	-.00097	.00070
2638	-8.8	-4.9	7.9	14.4	.372	.863	.00688	-.00101	.00070
2639	-8.8	-4.9	8.9	14.4	.372	.863	.00649	-.00102	.00070
2640	-7.6	-5.4	7.5	14.9	.373	.863	.00816	-.00098	.00073
2641	-7.6	-5.4	7.4	14.9	.373	.863	.00812	-.00097	.00073

Table 13. Continued

(b) Concluded

RUN	89	POINT	α_s	A_1	B_1	θ	μ	$M_{1,90}$	C_L	C_D	C_Q
2645	-7.3	-5.3	7.3	14.6	.373	.865	.00801	-.00092	.00068		
2646	-7.3	-5.3	7.3	14.6	.373	.865	.00799	-.00092	.00068		
2647	-7.3	-5.3	7.3	12.7	.374	.865	.00588	-.00076	.00054		
2648	-7.3	-5.3	7.3	13.7	.374	.865	.00696	-.00085	.00061		
2649	-7.3	-5.2	7.3	14.6	.374	.865	.00801	-.00092	.00068		
2650	-7.3	-5.3	7.3	15.7	.374	.865	.00905	-.00097	.00077		
2651	-7.3	-5.2	7.3	16.7	.374	.865	.00998	-.00098	.00089		
2653	-7.3	-7.2	7.3	14.6	.375	.865	.00725	-.00106	.00070		
2654	-7.3	-6.3	7.3	14.6	.374	.865	.00762	-.00100	.00069		
2655	-7.3	-5.3	7.3	14.6	.374	.864	.00803	-.00093	.00069		
2656	-7.3	-4.3	7.3	14.7	.374	.864	.00847	-.00086	.00068		
2657	-7.3	-3.3	7.3	14.7	.373	.864	.00883	-.00078	.00068		
2658	-7.3	-5.3	5.4	14.6	.374	.864	.00886	-.00083	.00067		
2659	-7.3	-5.3	6.3	14.7	.374	.864	.00846	-.00089	.00068		
2660	-7.3	-5.3	7.3	14.6	.374	.864	.00800	-.00094	.00069		
2661	-7.3	-5.3	8.3	14.6	.374	.864	.00761	-.00099	.00069		
2662	-7.3	-5.3	9.3	14.6	.374	.863	.00723	-.00104	.00070		
2663	-6.3	-6.0	7.8	15.4	.374	.863	.00897	-.00098	.00076		
2664	-6.3	-6.0	7.8	15.4	.375	.863	.00896	-.00098	.00076		
2665	-5.2	-6.8	8.5	16.2	.375	.863	.00978	-.00098	.00085		
2666	-5.2	-6.8	8.5	16.2	.375	.862	.00981	-.00098	.00085		
2667	-4.2	-7.6	9.0	17.1	.375	.861	.01055	-.00096	.00099		
2668	-10.6	-5.1	7.4	16.1	.398	.884	.00709	-.00113	.00082		
2669	-10.5	-5.0	7.4	15.8	.397	.883	.00691	-.00109	.00079		
2670	-10.4	-5.3	7.6	16.1	.397	.883	.00712	-.00113	.00082		
2671	-10.4	-5.3	7.6	16.1	.397	.883	.00712	-.00113	.00082		
2672	-9.0	-5.8	8.1	16.5	.399	.882	.00797	-.00113	.00087		
2673	-9.0	-5.8	8.1	16.5	.399	.881	.00793	-.00112	.00087		

Table 13. Continued

(c) $\rho = 0.006 \text{ slug/ft}^3$; $M_T = 0.65$; $\gamma = 9.55$

RUN	76	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2174	.0	-2.7	1.1	4.0	.152	.751	.00440	.00007	.00016		
2175	.0	-3.2	1.6	6.0	.151	.750	.00611	.00005	.00022		
2176	.0	-4.0	1.9	8.0	.151	.749	.00782	.00005	.00031		
2177	.0	-4.7	2.2	9.9	.151	.750	.00941	.00002	.00042		
2178	.1	-5.5	2.5	12.0	.151	.750	.01097	.00000	.00056		
2179	.1	-6.5	2.7	14.0	.152	.751	.01241	-.00007	.00074		
2180	.0	-4.9	2.0	10.0	.149	.748	.00947	.00004	.00043		
2181	-1.8	-4.7	2.1	10.0	.152	.751	.00902	-.00024	.00045		
2182	-1.8	-5.5	2.5	12.0	.151	.750	.01057	-.00033	.00059		
2183	-1.8	-6.3	2.9	14.0	.154	.751	.01202	-.00045	.00076		
2184	-1.8	-3.8	1.9	8.0	.154	.751	.00746	-.00017	.00034		
2185	-1.8	-2.9	1.7	6.0	.154	.750	.00576	-.00011	.00026		
2186	-1.8	-2.2	1.4	4.0	.154	.750	.00409	-.00005	.00020		
2187	-5.0	-2.1	1.2	4.0	.153	.751	.00332	-.00019	.00021		
2188	-5.0	-2.6	1.7	6.0	.151	.749	.00501	-.00035	.00028		
2189	-5.0	-3.3	1.9	7.9	.149	.748	.00661	-.00049	.00036		
2190	-5.0	-4.1	2.2	10.0	.150	.749	.00823	-.00065	.00048		
2191	-5.0	-4.8	2.6	12.0	.151	.749	.00983	-.00083	.00062		
2192	-5.0	-5.5	2.8	14.0	.151	.749	.01125	-.00099	.00079		
2193	-5.0	-5.9	3.0	14.9	.152	.749	.01192	-.00109	.00089		
2194	-6.2	-1.4	3.2	6.0	.301	.849	.00336	-.00015	.00024		
2195	-6.2	-2.3	4.0	7.9	.303	.848	.00498	-.00037	.00032		
2196	-6.2	-3.3	4.8	10.0	.303	.848	.00655	-.00059	.00042		
2197	-6.2	-4.4	5.5	12.0	.302	.848	.00806	-.00081	.00054		
2198	-6.2	-5.4	6.3	14.0	.302	.848	.00943	-.00103	.00070		
2199	-6.2	-6.6	7.1	16.0	.301	.847	.01054	-.00128	.00093		
2200	-8.0	-4.0	5.3	12.0	.302	.848	.00728	-.00093	.00056		
2201	-8.0	-5.0	6.1	14.0	.302	.848	.00875	-.00120	.00072		
2202	-8.0	-6.2	6.7	16.0	.303	.847	.01000	-.00146	.00093		
2203	-8.0	-4.0	5.3	12.0	.302	.848	.00729	-.00092	.00056		
2204	-8.0	-3.0	4.5	9.9	.304	.849	.00575	-.00065	.00043		
2205	-8.0	-2.0	3.7	8.0	.302	.848	.00420	-.00040	.00032		
2206	-8.0	-1.0	2.8	6.0	.302	.846	.00259	-.00014	.00022		
2207	.1	-2.1	3.7	5.9	.306	.848	.00601	.00014	.00015		
2208	.1	-3.1	4.6	7.9	.305	.847	.00768	.00009	.00020		
2209	.0	-4.2	5.5	10.0	.307	.847	.00922	-.00001	.00031		
2210	.0	-5.3	6.4	12.0	.304	.847	.01053	-.00013	.00045		
2211	.0	-6.4	7.2	14.0	.306	.846	.01179	-.00028	.00065		
2212	.0	-7.8	8.0	16.0	.305	.847	.01269	-.00048	.00090		

Table 13. Continued

(c) Continued

RUN	77	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2216	-1.7	-3.5	1.7	6.9	.152	.754	.00657	-.00015	.00026		
2217	-1.7	-3.5	1.7	7.0	.150	.753	.00662	-.00015	.00026		
2218	-2.8	-3.3	2.6	7.2	.203	.787	.00653	-.00026	.00026		
2219	-2.8	-3.2	2.6	7.2	.201	.786	.00653	-.00025	.00025		
2220	-4.6	-3.2	3.6	8.3	.252	.819	.00659	-.00042	.00031		
2221	-4.6	-3.2	3.6	8.4	.253	.820	.00660	-.00042	.00031		
2222	-5.6	-3.3	4.2	9.2	.283	.840	.00654	-.00053	.00035		
2223	-5.6	-3.3	4.2	9.2	.282	.840	.00655	-.00053	.00035		
2224	-5.6	-3.3	4.3	7.2	.282	.840	.00436	-.00038	.00027		
2225	-5.6	-3.3	4.3	8.2	.282	.840	.00544	-.00047	.00031		
2226	-5.6	-3.3	4.2	9.2	.282	.839	.00655	-.00053	.00035		
2227	-5.6	-3.3	4.2	10.2	.283	.840	.00758	-.00058	.00040		
2228	-5.6	-3.3	4.2	11.2	.280	.838	.00865	-.00060	.00045		
2229	-5.6	-5.3	4.2	9.2	.283	.840	.00594	-.00064	.00038		
2231	-5.6	-4.3	4.3	9.2	.282	.839	.00621	-.00058	.00037		
2232	-5.6	-3.3	4.3	9.3	.282	.839	.00656	-.00054	.00036		
2233	-5.6	-2.3	4.2	9.3	.282	.839	.00687	-.00048	.00035		
2234	-5.6	-1.4	4.2	9.2	.282	.839	.00717	-.00042	.00033		
2235	-5.6	-3.3	2.3	9.3	.282	.839	.00728	-.00043	.00034		
2236	-5.6	-3.3	3.3	9.2	.284	.840	.00688	-.00050	.00035		
2237	-5.6	-3.3	4.3	9.2	.283	.840	.00648	-.00054	.00036		
2238	-5.6	-3.3	5.3	9.2	.284	.840	.00614	-.00058	.00037		
2239	-5.6	-3.4	6.3	9.2	.282	.839	.00577	-.00062	.00037		
2240	-6.3	-3.3	4.7	9.9	.303	.853	.00651	-.00060	.00039		
2243	-6.3	-3.3	4.7	9.9	.302	.852	.00654	-.00060	.00040		
2244	-8.6	-3.6	6.0	12.4	.350	.885	.00650	-.00083	.00055		
2245	-8.6	-3.6	6.0	12.4	.351	.885	.00649	-.00083	.00055		
2246	-5.7	-3.3	4.2	9.2	.283	.838	.00648	-.00054	.00036		

Table 13. Continued

(c) Concluded

RUN	78									
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q	
2250	-8.5	-3.8	5.9	12.5	.350	.887	.00651	-.00082	.00055	
2251	-8.5	-3.8	6.0	10.5	.351	.887	.00431	-.00054	.00041	
2252	-8.5	-3.7	6.0	11.5	.350	.886	.00542	-.00069	.00048	
2253	-8.5	-3.7	5.9	12.5	.351	.887	.00650	-.00080	.00054	
2254	-8.5	-3.7	5.9	13.5	.351	.887	.00762	-.00089	.00061	
2255	-8.5	-3.7	6.0	14.5	.350	.886	.00870	-.00095	.00070	
2256	-8.6	-5.7	6.0	12.4	.350	.886	.00575	-.00085	.00055	
2257	-8.5	-4.7	6.0	12.5	.352	.886	.00613	-.00083	.00055	
2258	-8.5	-3.8	6.0	12.5	.352	.886	.00651	-.00080	.00055	
2259	-8.5	-2.7	6.0	12.5	.352	.886	.00692	-.00076	.00054	
2260	-8.5	-1.7	6.0	12.5	.351	.886	.00730	-.00071	.00053	
2261	-8.5	-3.8	4.0	12.6	.352	.886	.00744	-.00074	.00054	
2262	-8.5	-3.8	5.0	12.5	.350	.885	.00692	-.00077	.00054	
2263	-8.5	-3.7	6.0	12.5	.350	.885	.00652	-.00080	.00055	
2264	-8.5	-3.8	7.0	12.4	.351	.886	.00599	-.00081	.00055	
2265	-8.6	-3.7	8.0	12.4	.349	.885	.00567	-.00083	.00055	
2266	-10.0	-3.9	6.6	14.0	.373	.901	.00649	-.00094	.00066	
2267	-10.0	-3.9	6.6	14.0	.374	.900	.00654	-.00095	.00066	
2268	-10.0	-3.9	6.6	12.0	.372	.900	.00435	-.00063	.00049	
2269	-10.0	-3.9	6.6	13.0	.373	.901	.00539	-.00080	.00057	
2270	-10.0	-3.9	6.6	14.0	.373	.901	.00652	-.00095	.00066	
2271	-10.0	-3.9	6.6	15.0	.373	.901	.00758	-.00107	.00074	
2272	-10.0	-3.9	6.6	16.0	.373	.901	.00865	-.00116	.00084	
2273	-10.0	-5.9	6.6	14.0	.372	.900	.00574	-.00099	.00065	
2274	-10.0	-4.9	6.6	14.0	.372	.900	.00613	-.00098	.00066	
2275	-10.0	-3.9	6.6	14.0	.372	.900	.00653	-.00095	.00066	
2276	-10.0	-2.9	6.6	14.0	.372	.899	.00690	-.00092	.00066	
2277	-10.0	-1.9	6.6	14.0	.372	.899	.00731	-.00088	.00065	
RUN	80									
POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q	
2293	-9.9	-4.0	6.6	14.0	.373	.896	.00639	-.00092	.00065	
2294	-9.9	-4.0	4.6	14.0	.373	.897	.00727	-.00088	.00064	
2298	-9.9	-4.0	6.6	14.0	.373	.896	.00640	-.00090	.00065	
2299	-9.9	-4.0	7.5	14.0	.372	.896	.00607	-.00092	.00065	
2300	-9.9	-4.0	8.5	13.9	.371	.895	.00566	-.00092	.00065	
2301	-11.4	-4.6	7.4	16.0	.397	.913	.00663	-.00109	.00081	

Table 13. Concluded

(d) $\rho = 0.009 \text{ slug/ft}^3$; $M_T = 0.65$; $\gamma = 9.55$

RUN	96	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2833	.0	-1.5	1.1	1.9	.149	.749	.00188	.00011	.00014		
2834	.1	-2.2	1.2	4.0	.149	.749	.00349	.00008	.00015		
2835	.1	-3.0	1.4	6.0	.149	.747	.00506	.00005	.00019		
2836	.1	-3.8	1.5	8.0	.148	.747	.00659	.00003	.00026		
2837	.1	-4.5	1.6	9.9	.147	.747	.00807	.00001	.00034		
2838	-1.8	-4.3	1.5	9.9	.147	.747	.00769	-.00023	.00036		
2839	-1.8	-4.7	1.6	11.0	.147	.747	.00839	-.00027	.00041		
2840	-1.8	-3.6	1.4	8.0	.148	.747	.00622	-.00017	.00027		
2841	-1.8	-2.8	1.4	6.0	.149	.748	.00473	-.00010	.00021		
2842	-1.8	-2.0	1.3	4.0	.151	.749	.00318	-.00003	.00016		
2843	-1.8	-1.3	1.2	2.0	.151	.749	.00161	.00005	.00015		
2844	-5.0	-1.7	1.2	4.0	.150	.749	.00258	-.00014	.00017		
2845	-5.0	-2.4	1.3	6.0	.151	.751	.00408	-.00030	.00022		
2846	-5.0	-3.2	1.4	8.0	.148	.749	.00556	-.00044	.00029		
2847	-5.0	-4.0	1.5	9.9	.148	.749	.00700	-.00060	.00039		
2848	-5.0	-4.4	1.5	11.0	.146	.747	.00771	-.00067	.00044		
2849	-5.0	-4.8	1.6	12.0	.147	.748	.00839	-.00075	.00050		
2850	-6.2	.2	3.0	6.0	.298	.848	.00232	.00003	.00020		
2851	-6.2	-.9	3.6	8.0	.299	.847	.00380	-.00020	.00025		
2852	-6.2	-2.1	4.2	9.9	.300	.847	.00526	-.00042	.00033		
2853	-6.2	-3.3	4.8	12.0	.300	.847	.00664	-.00065	.00042		
2854	-6.2	-3.3	4.8	12.0	.300	.847	.00662	-.00065	.00042		
2855	-6.3	-3.9	5.1	13.0	.300	.847	.00730	-.00077	.00048		
2856	-6.3	-4.5	5.3	13.9	.300	.846	.00797	-.00089	.00054		
2857	-8.0	-3.1	4.5	12.0	.300	.847	.00599	-.00075	.00044		
2858	-8.0	-4.3	5.1	14.0	.300	.847	.00734	-.00103	.00056		
2859	-8.0	-1.9	3.9	9.9	.299	.846	.00463	-.00049	.00034		
2860	-8.0	-.7	3.4	8.0	.299	.846	.00318	-.00024	.00025		
2861	-8.0	.4	2.7	6.0	.298	.845	.00168	.00003	.00018		
2862	.0	-3.0	1.4	6.0	.148	.747	.00493	.00000	.00019		
RUN	97	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2866	-9.2	-.3	4.5	10.0	.348	.882	.00330	-.00020	.00031		
2867	-9.2	-1.5	5.1	12.0	.348	.882	.00465	-.00049	.00041		
2868	-9.2	-2.2	5.5	13.0	.349	.881	.00532	-.00064	.00047		
2869	-9.2	-2.9	5.7	14.0	.348	.881	.00595	-.00080	.00054		

Table 14. Rotor Performance Data for Advanced Elastic Blade Set
 With Nonstructural Mass Added With $M_T = 0.65$, $\gamma = 9.55$,
 and $\rho = 0.006$ slug/ft³

(a) Five masses added at 60-percent-radius station

RUN	91	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2693	-1.7	2693	-3.5	1.7	7.0	.150	.747	.00661	-.00012	.00028	
2694	-2.0	2694	-3.7	1.6	7.1	.151	.748	.00658	-.00016	.00029	
2695	-2.0	2695	-3.7	1.6	7.1	.151	.746	.00663	-.00017	.00029	
2696	-2.8	2696	-3.3	2.6	7.3	.202	.782	.00657	-.00023	.00028	
2697	-3.2	2697	-3.4	2.5	7.4	.203	.781	.00657	-.00027	.00029	
2698	-3.3	2698	-3.4	2.5	7.5	.200	.779	.00663	-.00028	.00029	
2699	-4.5	2699	-3.2	3.6	8.4	.252	.813	.00663	-.00039	.00033	
2700	-4.9	2700	-3.4	3.5	8.6	.252	.813	.00665	-.00044	.00035	
2701	-4.9	2701	-3.4	3.5	8.6	.252	.812	.00665	-.00044	.00035	
2702	-5.6	2702	-3.3	4.3	9.3	.281	.832	.00657	-.00050	.00037	
2703	-5.9	2703	-3.5	4.2	9.5	.282	.832	.00660	-.00056	.00039	
2704	-5.9	2704	-3.5	4.2	9.5	.281	.831	.00659	-.00056	.00039	
2705	-6.3	2705	-3.3	4.7	10.0	.301	.849	.00657	-.00059	.00041	
2706	-6.6	2706	-3.5	4.8	10.2	.301	.848	.00655	-.00064	.00042	
2707	-6.6	2707	-3.5	4.8	10.2	.300	.847	.00655	-.00064	.00042	
2708	-8.5	2708	-3.7	6.0	12.5	.349	.880	.00664	-.00083	.00057	
2709	-8.8	2709	-3.7	6.0	12.5	.349	.880	.00652	-.00084	.00057	
2710	-8.8	2710	-3.7	6.0	12.5	.349	.880	.00652	-.00085	.00057	
2711	-10.0	2711	-3.9	6.6	14.0	.371	.894	.00669	-.00099	.00067	
2712	-9.7	2712	-4.0	6.6	13.8	.370	.894	.00658	-.00095	.00065	
2713	-9.7	2713	-4.0	6.6	13.8	.371	.894	.00660	-.00096	.00065	
2714	-11.5	2714	-4.2	7.3	15.5	.396	.911	.00645	-.00108	.00078	
2715	-11.5	2715	-4.2	7.3	15.5	.396	.911	.00644	-.00109	.00078	

Table 14. Concluded

(b) Three masses added at 60-percent-radius station

RUN	94	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2766	-1.5	-3.7	1.6	7.0	.150	.750	.00669	.00011	.00027		
2767	-1.5	-3.7	1.6	7.0	.151	.750	.00671	-.00012	.00027		
2768	-2.6	-3.5	2.5	7.3	.203	.784	.00666	-.00022	.00027		
2769	-2.6	-3.5	2.5	7.3	.202	.783	.00668	-.00022	.00027		
2770	-4.3	-3.5	3.4	8.4	.251	.815	.00670	-.00039	.00032		
2771	-4.3	-3.5	3.4	8.4	.251	.814	.00672	-.00038	.00032		
2772	-5.4	-3.6	4.2	9.4	.280	.834	.00672	-.00051	.00037		
2773	-5.4	-3.6	4.2	9.4	.281	.834	.00673	-.00051	.00037		
2774	-6.2	-3.6	4.6	10.1	.301	.847	.00667	-.00059	.00041		
2775	-6.2	-3.6	4.6	10.1	.301	.847	.00666	-.00059	.00041		
2776	-8.4	-3.9	5.9	12.5	.348	.879	.00667	-.00081	.00057		
2777	-8.4	-3.9	5.9	12.5	.348	.879	.00666	-.00081	.00056		
2778	-9.5	-4.1	6.6	13.8	.370	.893	.00662	-.00091	.00065		
2779	-9.5	-4.1	6.6	13.8	.372	.894	.00663	-.00092	.00065		
2780	-11.2	-4.5	7.3	15.6	.396	.911	.00660	-.00106	.00079		
2781	-11.2	-4.5	7.3	15.6	.397	.911	.00659	-.00106	.00079		
2782	-1.5	-3.8	1.6	7.0	.152	.747	.00675	-.00012	.00027		

(c) Seven masses added at 60-percent-radius station

RUN	98	POINT	α_s	A ₁	B ₁	θ	μ	M _{1,90}	C _L	C _D	C _Q
2874	-2.0	-3.5	1.5	6.8	.154	.751	.00643	-.00015	.00027		
2875	-2.0	-3.5	1.5	6.8	.153	.751	.00643	-.00015	.00026		
2876	-3.3	-3.3	2.3	7.2	.202	.783	.00644	-.00027	.00027		
2877	-3.3	-3.3	2.3	7.2	.201	.782	.00644	-.00027	.00027		
2878	-5.0	-3.3	3.2	8.3	.252	.816	.00642	-.00043	.00032		
2879	-5.0	-3.3	3.2	8.3	.252	.816	.00644	-.00043	.00032		
2880	-6.1	-3.3	4.0	9.2	.281	.835	.00644	-.00054	.00037		
2881	-6.1	-3.3	4.0	9.2	.281	.835	.00644	-.00054	.00037		
2882	-6.9	-3.4	4.4	10.0	.302	.849	.00647	-.00061	.00042		
2883	-6.9	-3.4	4.4	10.0	.302	.849	.00647	-.00061	.00042		
2884	-9.2	-3.6	5.7	12.5	.350	.881	.00650	-.00083	.00057		
2886	-10.3	-3.8	6.4	13.8	.371	.896	.00648	-.00094	.00066		
2887	-10.3	-3.8	6.4	13.8	.371	.896	.00648	-.00093	.00066		
2890	-11.9	-4.1	7.1	15.7	.398	.913	.00653	-.00111	.00080		

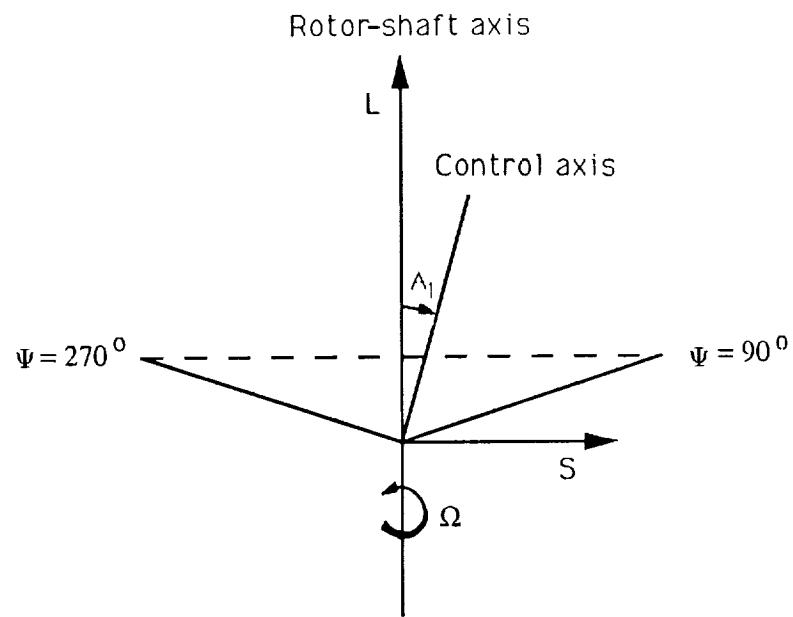
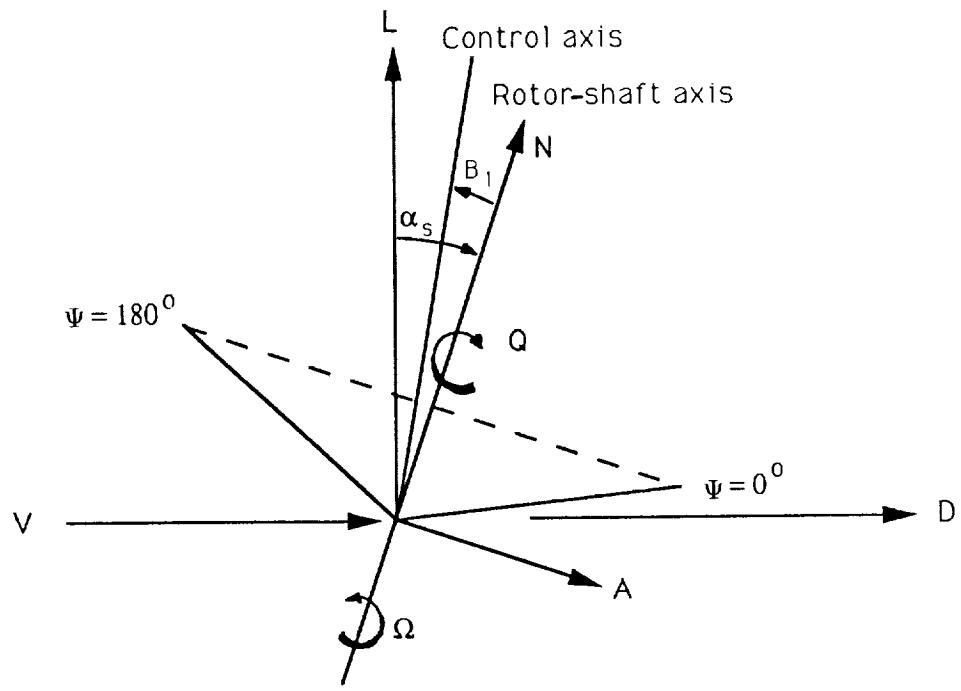
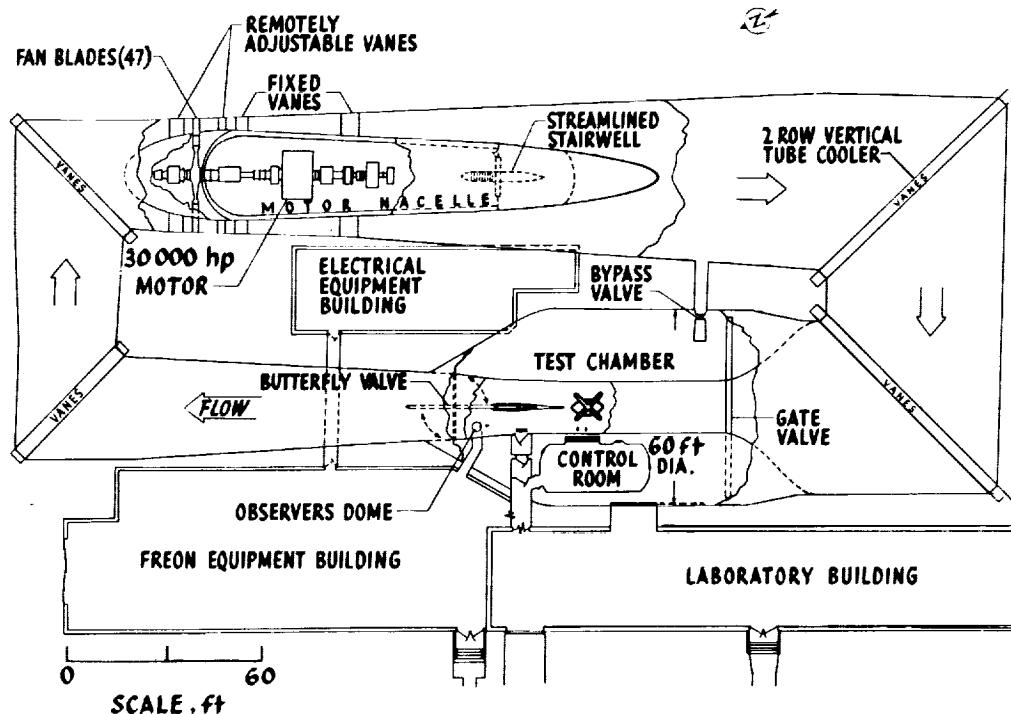
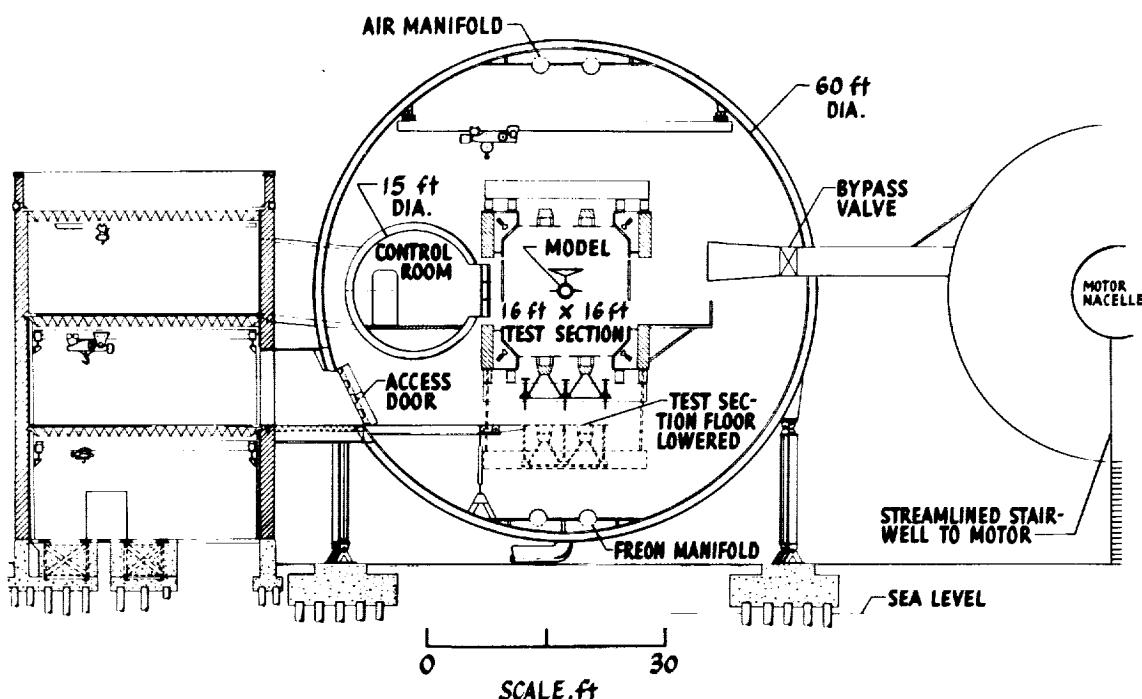


Figure 1. Notation showing positive directions of forces, angles, and velocities.



(a) Top view.



(b) Cross-sectional view.

Figure 2. The Langley Transonic Dynamics Tunnel (TDT).

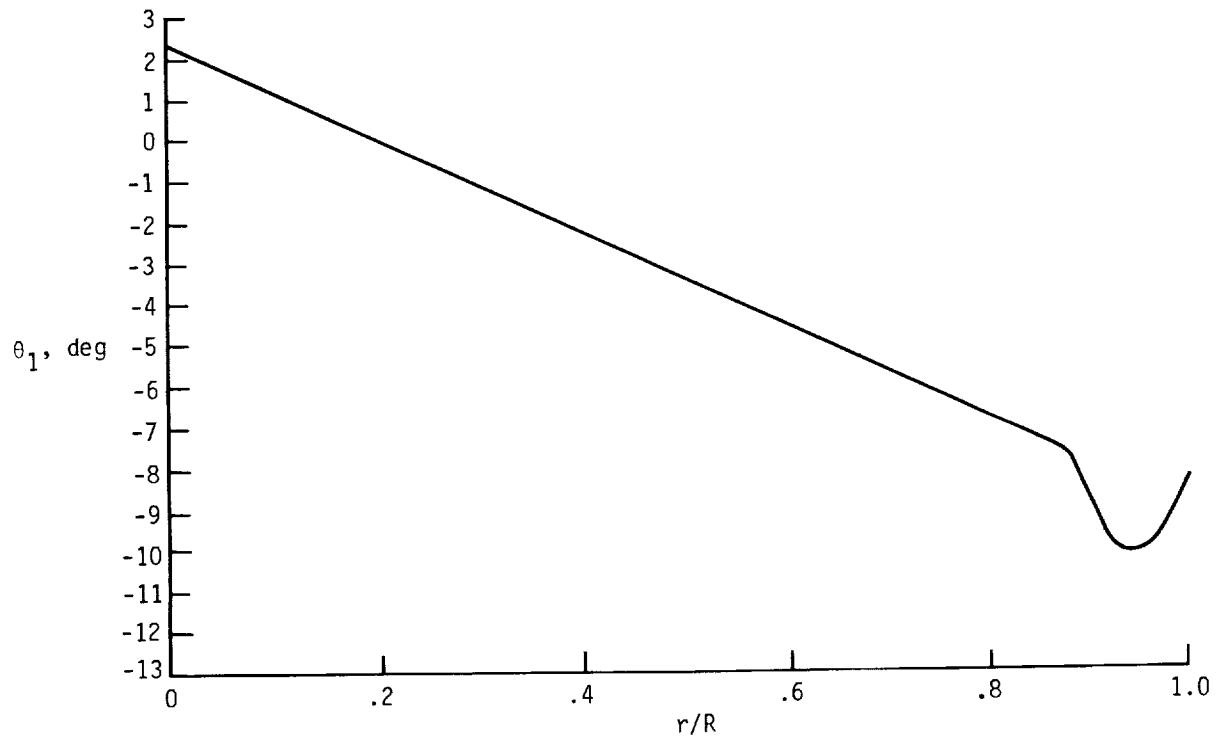
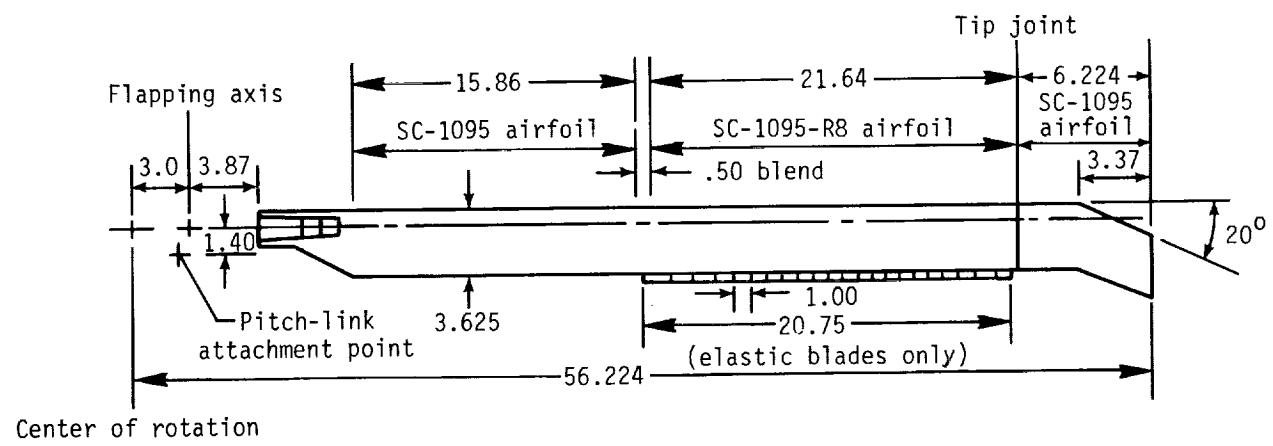


Figure 3. Baseline rotor-blade geometry and built-in twist distribution. Linear dimensions are given in inches.

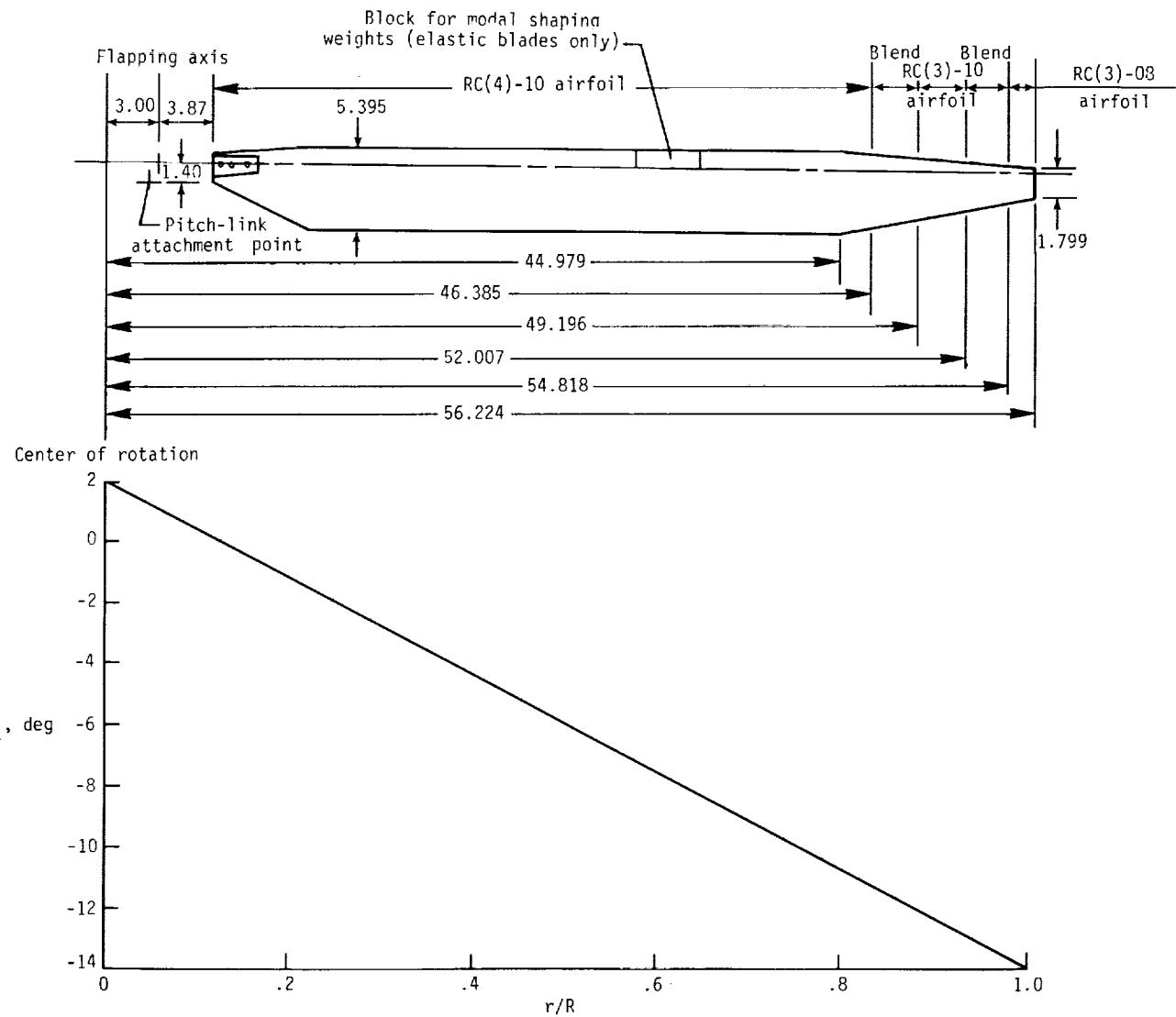


Figure 4. Advanced rotor-blade geometry and built-in twist distribution. Linear dimensions are given in inches.

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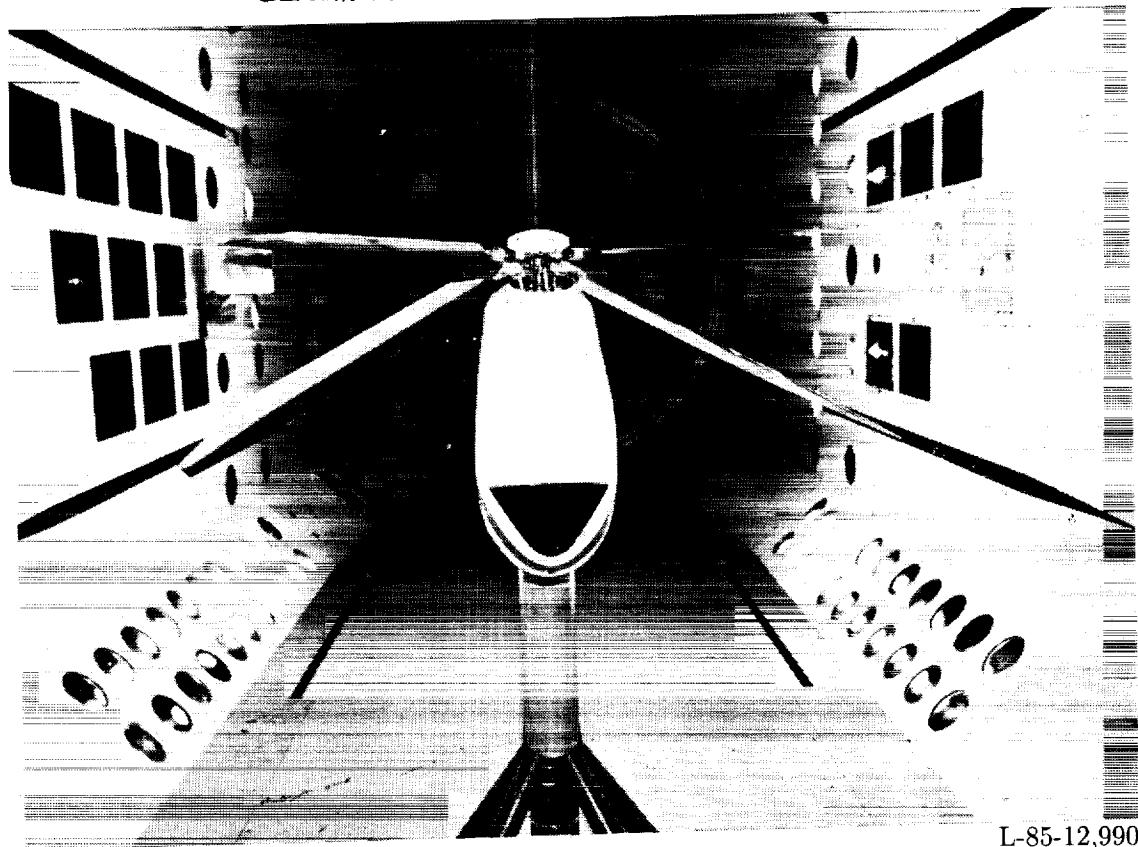


Figure 5. Aeroelastic rotor experimental system (ARES) model in the Langley Transonic Dynamics Tunnel.

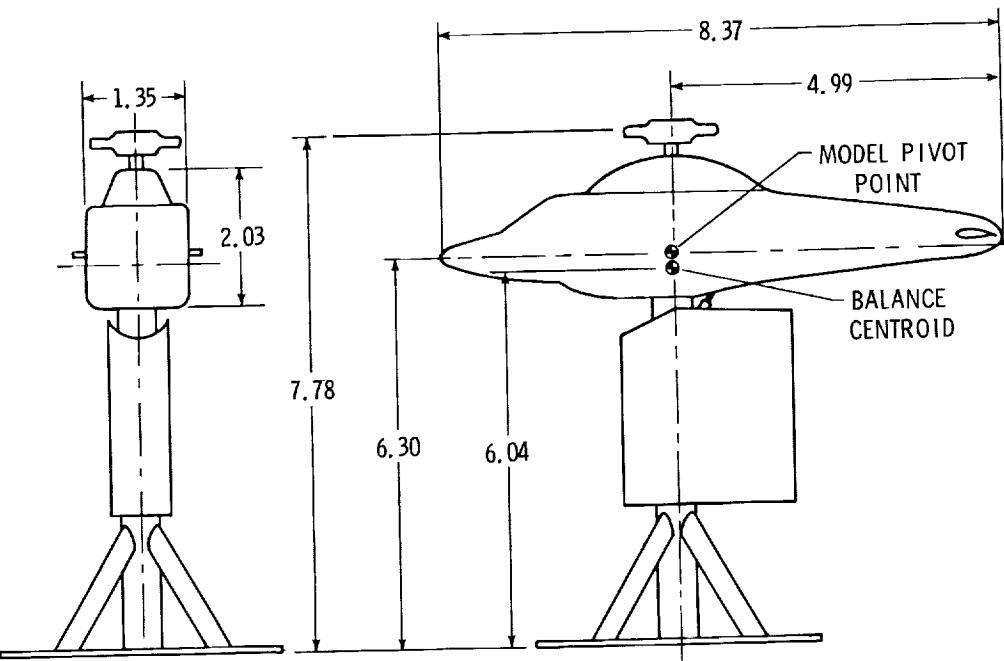


Figure 6. Schematic of aeroelastic rotor experimental system (ARES) model. All dimensions are given in feet.





Report Documentation Page

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16. Abstract An investigation was conducted in the Langley Transonic Dynamics Tunnel to evaluate an advanced main rotor designed for use on a utility-class helicopter, specifically the U.S. Army UH-60A Black Hawk. This rotor design incorporated advanced twist, airfoil cross sections, and geometric planform. For evaluation purposes, the current UH-60A main rotor was also tested and is referred to as the baseline blade set. A total of four blade sets were tested. One blade set of the baseline rotor and one of the advanced rotor were dynamically scaled to represent a full-scale helicopter rotor-blade design. The remaining advanced and baseline blade sets were not dynamically scaled so that the effects of structural elasticity could be isolated and studied. The investigation was conducted in hover and at rotor advance ratios ranging from 0.15 to 0.4 at a range of nominal test-medium densities from 0.00238 to 0.009 slug/ft ³ . This range of densities, coupled with varying rotor lift and propulsive force, allowed for the simulation of several combinations of vehicle gross weight and density altitude. Performance data are presented for all blade sets without analysis; however, cross-referencing of data with flight condition may be useful to the analyst for validating aeroelastic theories and design methodologies as well as for evaluating advanced-design parameters.			
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